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A TREATISE
ON
HOOPING-COUGH.



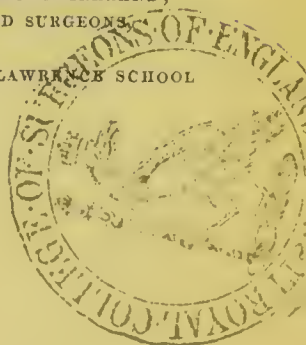
A TREATISE
ON
HOOPING-COUGH:

ITS COMPLICATIONS, PATHOLOGY,
AND TERMINATIONS.

WITH
ITS SUCCESSFUL TREATMENT BY A NEW REMEDY.


BY
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TO

THE RIGHT HONOURABLE

THE EARL OF ELGIN AND KINCARDINE

GOVERNOR-GENERAL OF BRITISH NORTH AMERICA,
ETC. ETC.

MY LORD,

It is with great pleasure I avail myself of your Lordship's kind permission to Dedicate to you the present work, the basis of which was commenced—when in the practice of my profession in Canada—during your Lordship's administration.

I hope your Lordship will excuse my taking advantage of this occasion, to point to the universal prosperity and happiness of the people, everywhere manifest at the present time throughout the Canadian empire, which, under the blessings of Providence, have been mainly brought about by the wisdom and beneficence of your rule.

That your Lordship may long continue to hold the high position which adds lustre to your already distinguished name, is the sincere wish,

My Lord,

Of your Lordship's faithful servant,

GEORGE D. GIBB.



PREFACE.

VERY early in my career I was an attentive observer of the vexatious and tiresome difficulty experienced by the practical physician in the treatment of the Hooping-cough, and after the application of remedies, too, recommended by that experience which should entitle to confidence in their use. But how often, indeed, has the use of one medicine followed another, to be in its turn rejected, and, finally, to leave the little patient not only worse in the degree of severity of the disease, but perhaps attended with some fatal complication. The anxious physician, therefore, hails the advent of some new remedy, if not with pleasure, at least with hopeful anxiety that it may prove that which it is declared to be, a certain remedy for the disease.

I had long watched this affection, and the various forms of treatment to which it was submitted, by men of the greatest intelligence and professional distinction, in the hospitals of this

kingdom, and in the French and Irish capitals; and, although the treatment was so varied in its scope and range, my convictions were not such as to lead me to adopt any one form of treatment in preference to another on commencing my labours in a more distant and severer clime.

I have witnessed the palliation of the severer symptoms, the enjoyment of a certain amount of ease and comfort to the child, but seldom, very seldom, has the disease been completely cut short in its course. In a patient under my care, after having, as I thought, on one occasion, succeeded in curing the disease, to my mortification its progress continued the full period of six months, when its disappearance might be justly attributed to the change in the seasons, in the advent of spring upon a long and severe winter.

The four children of a medical friend, who was my neighbour, were ill the greater part of a winter from this affection; their sufferings were most distressing, the infant in arms being affected equally with those of elder years. Treatment was in vain, and uneasiness was taking possession of the minds of the parents, when another medical friend accidentally stepped in, and recommended nitric acid in solution. The children were kept indoors owing

to the inclemency of the weather, and were all perfectly cured in three weeks.

For the knowledge of this new remedy in hooping-cough I am indebted to my late colleague and personal friend, Doctor Arnoldi, of Montreal, who was the first to use it in the treatment of this disease ; how successfully, the sequel of this little book will show.

As the study of hooping-cough has occupied my attention many years, and entertaining some new views in regard to its nature and pathology, being also desirous of advocating this new remedy, of great value in its treatment, I have therefore prepared the present imperfect essay.

The first chapter gives a brief summary of the minute anatomy of the lungs, and their nerves, to assist in the explanation of the pathological phenomena of the disease. A consideration of its history follows, interesting to those in favour of its antiquity, and which, I believe, may be dated from an extremely remote period of time.

The chapter on the mortality contains many accurate tables of value upon the statistics of deaths in the Metropolis, and in the whole of England, which have been carefully prepared from the volumes of the Registrar-General, and which

have not before appeared in relation to the present disease.

The general features of the disease are particularly described in the chapter on the symptoms; and all the complications which have ever arisen in the progress of the affection have had more than an ordinary amount of attention bestowed upon them, and some of them are described for the first time. Following these is a chapter on the numerous terminations of hooping-cough, which contains many facts of interest.

In the pathology of pertussis a solution has been attempted, which, from the plan adopted in carrying it out, may be received favourably. Most certainly some points in connexion with it are set at rest, and a careful perusal of the chapter upon it, together with the one following, on its nature and seat—in the latter of which this question is summed up—will be necessary to fully comprehend the conclusions arrived at. The opinions of others* have been freely given as assisting in a very great measure the solution of this difficult subject, which, as rendered according to my own views, is simple in its nature, easily comprehensible, and explained with facility by the phenomena during life and the appearances after death.

* Ninety-three in number.

The assertion that pertussis is a disease of all climates is for the first time practically considered in a separate chapter, and the evidence adduced to prove this is of great value indeed. I am indebted for a portion of it to the kindness of those whose names are mentioned in this chapter, and I avail myself of this occasion to return them my grateful acknowledgments. In relation to the Canadas and South America, facts are communicated not before published, for which I am personally responsible. The details of this chapter lead me to believe that they will not prove uninteresting.

Not less than three chapters have been devoted to the consideration of the treatment recommended by almost every writer; the work would have been incomplete without these, and no apology is necessary for their introduction.

Chapter XVIII. contains a description of the treatment of the simple affection by the new remedial agent, with cases; together with remarks upon its general utility; and the following and concluding chapter refers to the treatment of the various complications.

A very copious and complete index is added, and also an index of names.

Every effort has been made, compatible with the

scope of the work, to condense as much as possible the immense mass of facts connected with the elucidation of the subject, and if my remarks are necessarily brief, this must be my excuse. Nothing has been omitted having the least possible bearing upon it, and many new facts have been embodied so as to render the whole a volume, not only of practical utility but of especial reference.

With these observations it is not without some diffidence and considerable hesitation that I venture to submit to the indulgence of the profession a book which I feel convinced contains many imperfections, but as my motives are honest and conscientious in their nature, I humbly trust that these deficiencies will not be too harshly dealt with.

G. D. G.

59, *Guildford Street, Russell Square.*

May, 1854.

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ON HOOPING-COUGH.

CHAPTER I.

SUMMARY OF ANATOMY OF THE LUNGS.

THE organs contained within the cavity of the chest consist of the lungs and heart, the numerous blood-vessels and nerves passing into and out of the chest, the œsophagus and thoracic duct, much cellular tissue, and many lymphatic glands.

The lungs, the organs of respiration, two in number, are situated on either side of the spine, and when filled or distended with air, as they constantly are during life, they so exactly fill each side of the chest, that the pulmonary and costal pleura are always in perfect apposition, so that there never can be any immediate cavity.

They are conical in their form, with the apex round and often irregularly bulged, and when distended rise into the neck to a height varying from one to two inches above the level of the first rib; this bone can be occasionally seen to press upon it anteriorly.

The apex of the right lung usually rises higher than that of the left, and on both sides is beneath the anterior scalenus muscle and subclavian artery.

The base of the lungs which is directed downwards, is concave, particularly of the right, and is accurately moulded to the convexity of the diaphragm. This concavity of the base is increased on the right side owing to the position of the liver. It is sloped off obliquely downwards and backwards, so that it projects much lower by its posterior than its anterior border.

Although both of a conical form, the right lung is wider and shorter than the left, which is due to the position of the liver below, and the direction of the heart to the left side. It is divided into three lobes, and the left into two only.

This division of the lungs into lobes constitutes the interlobular fissures, which penetrate to a great depth, excepting the middle fissure, and the opposed surfaces are smooth and serous. Sometimes both lungs are divided into three lobes; occasionally there is an absence of this division in the right, and cases have been recorded of three or four lobes in the right, and three or four in the left. The lungs themselves are made up of the ramifications of the bronchial tubes, and of minute arteries, veins, nerves, and lymphatics. This has been divided into two systems of apparatus, the first, the vascular or circulatory apparatus, consisting of arteries and

veins, together with the plexuses formed by the union of the capillaries proceeding from both sets of vessels ; the second, the respiratory or æriferous system, which includes the bronchial tubes, the air cells, and the ciliated epithelium.

All these united constitute the parenchyma or substance of the lungs, which is held together by cellular tissue, which on a section is seen to consist of small polygonal divisions, or lobules, which are connected to each other by an inter-lobular tissue. These lobules again consist of smaller lobules, and the latter are formed by a cluster of air cells, in the parities of which the capillaries are distributed.

Of the circulatory apparatus, the vessels engaged in the formation of this, are the ramifications of the pulmonary artery and veins, the former terminating in capillary vessels, which form a minute network upon the parietes of the bronchial or air-cells, and then by their convergence form the pulmonary veins, by which the purified arterial blood is returned to the left side of the heart.

The respiratory or æriform system consists of the bronchial tubes, which divide and subdivide, but without anastomoses, like the branches of a tree, and send branches to every part of the organ. The walls of the tubes contain distinct longitudinal and circular layers of fibrous structure ; but the latter alone, according to Professor Kolliker, contain muscular fibre cells. One pecu-

liarity exists worthy of notice in relation to these fibres;—the muscular fibres which exist in the trachea are continued down even to the terminal bronchi, but instead of filling up the gap in the cartilaginous framework, posteriorly, as in the trachea, they form a uniform layer encircling the canal, but excessively thin.

These tubes retain all their ordinary characters until they are by successive branchings reduced to the thirtieth or fiftieth of an inch in diameter, when these structures—the longitudinal and annular fibres, together with the ciliated epithelium, abruptly terminate; their walls are then formed of only a tough elastic membrane, with traces of fibrous, perhaps muscular structure, over which the capillaries are spread in a very dense network, and on various parts of which air-cells irregularly open. The tubular form of the air-passages beyond the termination of the longitudinal and circular fibres is retained for some distance; but it is gradually changed by the irregular branches of the passages and by the increase of the number of apertures in their walls which lead to the air vesicles. These tubes have been named by Mr. Rainey *intercellular passages*.

The air-cells opening into these are placed singly on their walls, like recesses from them; but oftener are arranged in rows like minuter succulated tubes, so that a succession or series of

cells, all opening into one another, open by a common orifice into the tube, and thus forms a lobule. The cells of adjacent lobules do not communicate; and those of the same lobule or proceeding from the same intercellular passage, do so as a general rule near the angles of bifurcation; so that when any bronchial tube is closed or obstructed, the supply of air is lost for all the cells opening into it or its branches.

The cells are of various forms, according to the mutual pressure to which they are subject; they are smaller in the centre of the lung, and their network of capillaries is there closer than those nearer to the circumference. The walls of the air-cells are formed of a very thin and transparent membrane, which is folded sharply at the orifices of communication, so as to form a very definite border to them, and which is lined by an epithelial layer, composed of minute polygonal cells of from 1-1600th to 1-2250th of an inch in diameter. This lining membrane is distinctly fibrous; and its fibres are particularly strong and well marked around the apertures of communication between the contiguous air-cells. These fibres have not any resemblance to muscular tissue, but rather correspond with those of yellow fibrous tissue.

The capillary plexus is so disposed between the two layers which form the walls of two adjacent air-cells as to expose one of its surfaces to each,

by which provision the full influence of the air upon it is secured. The network of vessels is so close that the diameter of the meshes is scarcely so great as that of the capillaries which enclose them.

The *Nerves* supplying the lungs are derived from the pneumogastric and sympathetic. They form two plexuses—the anterior and posterior pulmonary plexus. The branches from the anterior supply the substance of the lung along the great vessels, whilst those of the posterior follow the course of the bronchial tubes, and are distributed to the air-cells.

The source from which the nervous influence is derived, as necessary for the respiratory movements, is the *medulla oblongata*, and the spinal cord is, as it were, the trunk of the nerves which arise from it. The respiratory movements and their regular rhythm, in their being ordinarily involuntary and independent of consciousness, are under its absolute governance, which, as a nervous centre, receives the impression of the “necessity of breathing,” and reflects it to the phrenic and such other motor nerves as will bring into action the muscles necessary to inspiration.*

That part of the interior of the medulla oblongata, from which the pneumogastric nerves arise, is the *centre* whence the nervous force for the production of combined respiratory movements

* Kirkes and Paget's Physiology.

appears to issue. With care, the medulla oblongata may be divided to within a few lines of this part, and its exterior may be removed without the stoppage of respiration ; but it immediately ceases when this part is invaded. The chief “excitor” of the respiratory movements is unquestionably the pneumogastric nerve ; its trunk, however, is not endowed with sensibility, as when it is pinched or pricked the signs of pain are not nearly so acute as when the trunks of the ordinary spinal nerves, or of the fifth pair, are treated so. Its power as an excitor of respiration is very great, and must arise from impressions made upon its peripheral extremities. The impression is probably due to the presence of venous blood in the capillaries of the lungs, or, as Dr. Marshall Hall thinks, to the presence of carbonic acid in the air-cells.* Both may be true.

Among other excitors of the respiratory muscles are the nerves distributed to the general surface and particularly to the face ; and in exciting the first impression, the fifth pair seems the principal agent.

The sympathetic nerve, also, which derives many filaments from the cerebro-spinal system, and which especially communicates with the pneumogastric nerves, may be one of the excitors of this function. This is due not only to its ramifi-

* Carpenter’s Human Physiology. Fourth Edition.

cations in the lungs, which are considerable, but also to its distribution on the systemic vessels, so that it may convey to the spinal cord the impression of imperfectly-arterialized blood circulating through these, such as the pneumogastric is believed to transmit from the lungs.

The motor or “efferent” nerves concerned in the function of respiration are those which Sir Charles Bell has grouped together in his “respiratory system.” The most important of these—the phrenic—arises from the upper part of the spinal cord; the intercostals, much lower down; whilst the facial nerve and the spinal accessory, to the latter of which the motor powers of the pneumogastric are chiefly due, take their origin in the medulla spinalis itself.

Bronchial Tubes.—Much of the force exerted in inspiration is employed in overcoming the resistance offered by the elasticity of the walls of the chest and of the lungs.

It is probable that in the ordinary quiet respiration, which is performed without consciousness or effort of the will, the only forces engaged are those of the inspiratory muscles and the elasticity of the walls of the chest and lungs. And it is not known under what circumstances the *contractile power* is brought into action by means of their organic muscular fibres, which the bronchial tubes, and perhaps the air-cells, possess. It may

assist in expiration, but there is no evidence to prove it ; and it is more likely that its purpose is to regulate and adapt in some measure the quantity of air admitted into the lungs and to each part of them according to the supply of blood. The muscular action in the lungs, morbidly excited, is probably the chief cause of the phenomena of spasmodic asthma ; and I may with propriety add also, the cause of the spasmodic kinks in hooping-cough.

This may be demonstrated by galvanizing the lungs shortly after removal from the body ; under such a stimulus they contract so as to lift up water placed in a tube introduced into the trachea, as shown by Dr. Williams. And Volkmann has shown that they may be made to contract by stimulating their nerves. He tied a glass tube, drawn fine at one end, into the trachea of a beheaded animal, and when the small end was turned to the flame of a candle, he galvanized the pneumogastric trunk ; each time he did so, the flame was blown, and once it was blown out. *

* See Dunglison's Human Physiology. Todd and Bowman's Physiology, and others. Also Hassall's Microscopical Anatomy.

CHAPTER II.

HISTORY OF HOOPING-COUGH.

ALTHOUGH no authentic record is found among the Greek, Roman, or Arabian writers, of this disease, it is not too much to suppose that it must have existed from the very earliest of times, as one likely to affect individuals once in the course of their lives.

It must have been familiar to Hippocrates, notwithstanding no reference whatever is made to it in his writings, being alluded to most probably by him in his aphorisms, under the general term of coughs, on the different ages, and the diseases peculiar to them. Very likely also it may have presented itself to the notice of Galen, as he gives some ingenious remarks on the causes of coughing. The Arabian physician, Avicenna, gives an account of violent epidemic coughs, sometimes attended with spitting of blood, and during the paroxysms of which the patients became black in the face. He speaks of the treatment of coughs, *particularly of infants*, and recommends emetics and demulcents. Rhazes has given a receipt for cough pills.

Can such diseases as asthma, phthisis, pleuritis, pneumonia, empyema, and others, have been familiar to them, and pertussis remain undescribed, unnoticed, and looked upon, very probably, as a form of curable asthma in the child, or possibly a strong cough simply? Syphilis and some other peculiar affections are not described by any ancient author, and yet the fact must be considered indisputable from biblical and other evidence that such diseases existed at a very remote period. The same reasoning will hold good with respect to hooping-cough.

There is, however, some difference of opinion among medical writers on this subject. Dr. Gregory states it is impossible to suppose that a disease so strongly marked as this could have escaped the attention of the ancient physicians, had it then existed. We must presume, he says, therefore, that it was not known in Europe before the thirteenth or perhaps even the fourteenth century.* Dr. Mackintosh, again, says it is probable that it is not a disease of such recent origin as has been hitherto imagined. Gardien very sensibly states that if it has not been described in France until the year 1414, it is because it has always been confounded with other species of coughs.†

In the history of this disease given by Dr. Charles

* Theory and Practice of Medicine, 1839.

† Practice of Physic, 1832.

Aberle, he believes it to be coeval with all those diseases resulting from the effects of the vicissitudes of climate on the human frame. He assigns to it an antiquity as venerable as belongs to sore-throat and cold in the head.

It is true, he says, that the ancients make no distinct mention of this disease ; but it must be remembered how many disorders were frequently included under one general term. The ancient authors, too, whose works have descended to us, lived in a bland and genial atmosphere ; and the disease, when it appears there at the present day, is much modified by the climate.*

In the ancient chronicle of Celleusus, mention occurs of an epidemic cough attacking children, which spread through all Germany in the year 1173 ; but no detailed account, or accurate description of it, is extant.

Some of the older writers take notice of epidemics, which have been considered to have been hooping-cough, especially those of 1239 and 1311. But they may have been severe catarrhal epidemics, or influenza.

Epidemic spasmodic coughs, therefore, seem to have existed in all ages ; and although “the best writers agree with the eminent medical historian, Curtius Sprengel, that the hooping-cough was first

* *De Tussi Convulsiva*. See also Review in *Lancet*, Vol. i., 1846.

accurately noticed and described at the beginning of the fifteenth century," yet, even a perfect silence on the part of medical writers respecting it, prior to this time, should no more exclude it from the list of then-existing diseases, than the non-description of a plant by Dioscorides should cause its rejection from his "Flora" of his age, and should make us believe it a species lately arisen from some patent source of spontaneous generation. It is a strong argument in favour of the antiquity of the disease, that those writers who speak of it in the fifteenth century do not seem to consider it as anything new.*

Dr. Watt,† who was one of the first to write a treatise on this disease, and mainly induced to do so from deaths by it in his own family, states that it appears pretty certain this disease was wholly unknown to the Greeks, and he is fully of opinion with Astruc and others, that whooping-cough, as it now exists, has not been described by any of the Greek, Roman, or Arabian authors. That it was not especially described as an individual disease is perfectly true, but still it must have been met with as we must all believe.

Some writers believe it to be, as Aberle mentions, of modern origin, like small-pox and measles. Of these authorities, one party (Rosen) would place its

* Aberle's *Op. cit.*

† Treatise on Chincough, Glasgow, 1813.

cradle in Africa or the East Indies ; whilst another would assign it a birth-place, about the sixth century, on the shores of the northern seas, from which locality they believe it to have spread into the southern regions of Europe, with those hordes of barbarians whose countless multitudes gradually made spoil of the dismembered portion of the empire of Rome.

According to Mezeray, it first appeared in France in 1414 ; and he has been generally considered as having given the earliest account or description of the disease. But Dr. Copland considers that there is nothing characteristic about his description but the name *coqueluche*. The epidemics described by De Thou and Pasquier, to which the same name was given, and which occurred in 1510 and 1537, were, he also remarks, evidently influenza, and not hooping-cough. And the same remark is applicable to most of the supposed epidemics of this latter disease, during the sixteenth and seventeenth centuries.*

If we discard testimony which appears to be of some value in the history of this affection, merely because there may not have been that clearness of description which is adopted at the present day, then I am afraid we shall convert it into a disease of unusually modern origin. I must, therefore, differ with Dr. Copland, for this reason : that per-

* Dictionary of Medicine.

tussis has been known traditionally to be a disease existing among the French inhabitants of Canada from the period of their first settling in that country, now upwards of three hundred years ago, and if we will acknowledge that it was imported from France at that time, under its generic name, then we cannot deny the truth of the epidemics described by the French writers as being most truly those of hooping-cough.

However little, Dr. Watt says, may have been said of this disease by the ancients, it is uncertain how long it has continued to afflict the human race. We have no certain account of its origin in any one country. In Britain, it has prevailed from time immemorial; and in other countries, particularly those of Europe, we have reason to suppose that it has done the same.

One of the earliest authors who has described hooping-cough is Willis, who practised first at Oxford and afterwards in London, and died in 1675. He speaks of it as being well known at that time, and was the first who accurately described it under the name of "*Tussis puerorum convulsiva, seu suffocativa, et nostro idiomate chin-cough vulgo dicta;*" that it was a disease to which children were liable; that it was epidemic, and occurred most commonly in spring and autumn. He remarks that physicians had then very little opportunity of being acquainted with the disease;

for old women and quacks were oftener consulted than regular physicians, and rational modes of cure gave place to empirical prescriptions. He published his description of it in 1664, and it is only from his time that we have any account of the disease that can be relied upon.

Sydenham, who was partly the cotemporary and partly the successor of Willis, in giving an account of the measles, in 1670, incidentally mentions the chincough. At that time it appears to have been well known in London, and considered in so formidable a point of view, as to require the most vigorous treatment.

Dr. Rosen mentions in his book on Diseases of Children, that the disease was well known in Sweden, and gives an account of the mortality, from 1749 to 1764. But he confesses that he cannot determine when it first appeared in that country. As respects Britain, there is no account than earlier that of Willis which can be received.

Hoffman relates that the hooping-cough was epidemic at Berlin in the year 1709; and, from the extraordinary severity of the season, it became extremely malignant.

In the Medical History of Epidemics, by Ozanam, he states that it was without doubt rare, and unknown in the countries inhabited by the ancients. It seems also, he says, that it existed only in a portion of Europe, and that it never showed itself

between the tropics. It has been confounded up to the eighteenth century itself, with other catarrhal affections; but since then its nature has been better understood, and we have isolated this malady from the others.

If reference be made to the chapter in which hooping-cough is considered as a disease of all climates, from the evidence there brought forward in support of this view, it cannot but strike the observer that a disease which is so remarkably universal in its nature, and one which is not a stranger to any known climate, not excepting that of the tropics, must most assuredly have existed from the remotest of times, and can with the greatest propriety be dated as far back as that of the first peopling of our orbit. This opinion is pretty generally shared in by medical historians of the present day.

Of writers who have followed Willis, may be mentioned Sydenham, Millar, Alberti, Brendel, Butter, Danz, Paldam, Perrada, Watt, Marcus, &c.; and more recently Guibert, Desruelles, Blaud de Beaucaire, Blache, Guersent in the *Dictionnaire de Médecine*, Duges in the *Dict. de Méd. et Chir. Pratique*, C. Johnston in the *Cyclopædia of Practical Medicine*, Copland in the *Dictionary of Medicine*, Dr. Roe, a treatise on the disease, a work most justly esteemed by the profession for its lucid and clear views,—besides excellent notices in

the systematic works of Dewees, Meigs, Eberlè, Stewart, Condie, Maunsell and Evanson, Coley, Barrier, Underwood, Barthez and Rilliet, Rees, Bouchut, Churchill, West, and others. The chapters on Pertussis in the works on Diseases of Children, by Drs. Churchill and West, are in themselves complete and able treatises, and remarkable for the ability and research displayed by their learned authors.

It has obtained the following various popular and learned names. In England, it is known as the hooping-cough or whooping-cough, from the peculiar noise attendant upon the cough. Also it is sometimes called chincough, kincough, kinkcough, kindcough, from the German word "kind," a child. But Dr. Johnson thinks that the first part of the term, in kinkcough, may probably come from the Dutch word "kinckin," which signifies to pant. Chincough is supposed by some to be a corruption of the original word chaincough, given to it from the belief of its being an affection of the spine, which latter consisting of several parts joined to one another, like so many links, has been supposed to resemble a chain. In Scotland, kinkhoast; but Dr. Watt says that the term kinkcough is mostly confined to Scotland, and the word chincough is the ancient English expression for the disease. In France it is usually termed coqueluche. This word is supposed by many to be derived from

coqueluchon, a sort of cowl worn on the head during the epidemics of 1414, 1510, &c. Others again think it derived from the abundant use of the flower of the coquelicot (wild red poppy) in the treatment of this affection. Others in fine attribute the origin of the word to the loud respiration during the coughing, which imitates the crowing of a cock.* It is known there also, as *maladie cuculaire*, *toux quinteuse*, *catarrhe ou bronchite convulsive* of Laennec, and *paroxysmes quintes*. In Germany, *keichhusten*, *stickhusten*, *eselhusten* (the hoop being likened to the braying of an ass or to the bleating of a sheep), *kikhusten*, and *kramphusten*. In some parts of Germany, also, from certain peculiarities accompanying the access of coughing; as, for instance, the discoloration of the face, the name of *blueccough* has been given to it. In Sweden, *kikhosta*. In Italy, *pertosse*. Besides these, it has been called *tussis quinta*, or *quintana*, by Schenck. *Tussis clangosa*, by Bourdelin and Basseville. *Tussis convulsiva*, by Sauvages and Willis. *Tussis ferina*, by Hoffman. *Tussis delasans*, *T. suffocans*, *T. amphimerina*, *T. tussiculosa*, *T. stomachalis*, *T. spasmodica*, *T. perennis*, *T. puerilis*, *T. pueros strangulans*, by various authors. *Bronchitis epidemica*, by Marcus. *Bronchitis convulsiva*, by Prunel and Bourdet. *Broncho-cepha-*

* Dictionnaire des Dictionnaires.

litis, by Desruelles. Bex convulsiva, by Good. Affection pneumo-gastro-pituiteuse, by Tourtelles. And lastly pertussis, which was given by Sydenham, was retained by Huxham, and adopted by Cullen in his nosology as the distinctive technical appellation of the disease in this country, as whooping-cough is the popular.

All these names have been derived from some circumstance supposed to be peculiar to the disease, or in some way expressive of its nature.

CHAPTER III.

MORTALITY FROM HOOPING-COUGH.

IT is a matter of considerable moment, and furnishes food for very serious reflection, to glance over some of the tables of statistics in the present chapter of mortality from this disease. If the number of deaths appears large for all England, or even for London alone, with its teeming population, what may not the number amount to of children carried off annually in other countries? The sum total, in the number of deaths annually from this disease alone, throughout the world, or even in one of its great divisions, were it possible to obtain it, would appear fabulous. And it is only by drawing attention to such facts as these in a statistical form, that efforts can be made by governing bodies to improve the sanitary condition of towns and cities throughout the world. Can it be doubted for a moment, that hooping-cough, in common with many other diseases, depends upon causes removable in a sanitary point of view, which every now and then, under the influence of certain seasons, produce its appearance as an

epidemic. That it does occasionally reign as an epidemic, and is contagious in an eminent degree, are facts now too well known and generally admitted by the profession, to admit of dispute. It is equally as much so as scarlet fever or measles.

Its fearful ravages are confined also to a class of beings who are helpless of themselves, and whose tender age appears especially liable to its invasion. This will not be found the case scarcely with any other epidemic disease, as will be shown hereafter; and so destructive at certain seasons, that numerous children of entire families are swept off by it. To parents, then, who are endeavouring to rear their youthful brood, the importance of immediate resort to medical aid must appear evident, and valuable time should not be heedlessly lost in trusting to the futile and miserable efforts of quacks and charlatans, who are ever ready to thrust themselves upon the unwary, and whose impostures are certain to hurry the little patients sooner or later to destruction.

The following tables I have carefully compiled from the Abstracts of Diseases and Ages, which are published in the Annual Reports of the Registrar-General :—

1. *Mortality from four diseases in London, for 8 years, 1842 to 1849.*

Disease.	Males.	Females.	Total.
Small-pox	3659	3205	6864
Measles	5611	5138	11,049
Scarlatina	8515	7967	16,482
Hooping-cough	6332	7901	14,233

2. *Ages at which the deaths from the first three diseases occurred, in the above table.*

Disease.	Under 1 year.	Between 1 and 2.	Under 5 years.	Between 5 and 10.	Over 10 years.
Smallp-ox	1585	1296	4700	1190	974
Measles .	1762	3922	10,160	827	62
Scarlatina	1153	3110	11,245	4555	682

3. *Ages at which the deaths from Hooping-cough occurred in London, during the eight years, 1842 to 1849-*

	Males.	Females.	Total.
Under 1 year	2167	2328	4495
1 year and under 2 years .	1956	2460	4416
2 years " 3 " . .	985	1385	2370
3 " " 4 " . .	626	818	1444
4 " " 5 " . .	291	418	709
5 " " 10 " . .	249	404	653
10 " " 15 " . .	47	71	118
15 " " 20 " . .	4	7	11
20 " " 25 " . .	2	2	4
25 " and upwards " . .	5	8	13
	6332	7901	14,233

Of these there were under 5 years of age, males 6025, and females 7409; from 5 to 15 years, there were males 296, and females 475; and above 15 years, in both sexes, 28. The mortality appears to be the greatest under 2 years of age, amounting to the large number of 8911 cases; and under 5 years 13,434; leaving 799 cases above the last age. A most terrible proof of the fatality of this disease in early childhood.

Now, if these results are compared with those of the three other diseases, we find that hooping-cough is more fatal under 5 years of age than is either small-pox, measles, or scarlet fever. The mortality from scarlet fever for the 8 years was much greater in the total number than hooping-cough; but it was less by upwards of 2000 under 5 years of age: small-pox and measles, in proportion also to their total number of deaths, are much less fatal than hooping-cough under the same age.

This establishes pretty clearly that hooping-cough is more especially *the disease* of early life, and is more fatal under 5 years of age than any of the eruptive diseases, which may sometimes prove more fatal in the aggregate during the prevalence of epidemics.

If we again take the mortality under one year, we find that hooping-cough is 4495; whilst small-pox is 1585, measles 1762, and scarlet fever 1153. Between 1 and 2 years, hooping-cough is 4416;

whilst small-pox is 1296, measles 3922, and scarlet fever 1153: showing again how much more and infinitely fatal is hooping-cough than the other diseases under two years, and more particularly under one year.

But if hooping-cough is very much more fatal under 2 years than the other three diseases, it is less so between 2 and 5 years than scarlet fever; for while it is 4523, scarlet fever is 6982; and measles is 4476, approaching to it.

The fact, however, is satisfactorily established, that hooping-cough is more fatal under five years of age than any other disease, and is very much more so in infancy, compared with other diseases, which may prove more fatal than it in their aggregate number.

I shall now give the total number of deaths in London at all ages from the four diseases for a period of sixteen years, 1838 to 1853, for the purpose of determining the per-centage upon the total number of deaths from all causes, and also of showing which is the most fatal of the four:—

4. *Mortality from four diseases and from all causes, in London, for 16 years, 1838 to 1853.*

Year.	Small-pox.	Measles.	Scarlet Fever.	Hooping-cough.	All Causes.
1838	3817	588	1524	2083	53,546
1839	634	2036	2499	1161	46,100
1840	1235	1132	1954	1069	46,281
1841	1053	973	663	2278	45,284
1842	360	1293	1224	1603	45,272
1843	438	1442	1867	1908	48,574
1844	1804	1182	3029	1292	50,423
1845	909	2318	1085	1816	48,332
1846	257	747	928	2035	49,089
1847	955	1778	1433	1600	60,442
1848	1620	1135	4767	1630	57,628
1849	521	1154	2149	2349	68,432
1850	498	977	1178	1572	48,579
1851	1066	1322	1269	2161	55,354
1852	1166	600	2549	1565	54,213
1853	229	1018	2068	2644	61,202
Total	16,562	19,695	30,186	28,766	838,751

From this table it appears that scarlet fever and hooping-cough are the most fatal diseases out of the four in the metropolis; both are one-third more so than measles, and nearly twice as fatal as small-pox. The number of deaths from scarlet fever exceeds that of hooping-cough for the sixteen years by only 1420, a small amount compared with the excess in the whole of England, presently to be shown.

The mean annual number of deaths for the sixteen years, together with the proportion to the total number from all causes, stands as follows:—

Small-pox	1035 $\frac{1}{8}$ or 1 in 50 $\frac{5}{8}$
Measles	1231 or 1 in 50 $\frac{1}{2}$
Scarlatina	1886 $\frac{2}{3}$ or 1 in 27 $\frac{1}{5}$
Hooping-cough	1796 $\frac{2}{3}$ or 1 in 29 $\frac{1}{6}$

Of the entire class of zymotic diseases, although we find the mortality from typhus fever and diarrhoea to be very large, it is still less than that of scarlet fever and hooping-cough.

The following table gives the number of deaths in England from hooping-cough alone, for the period of eight years, 1838 to 1849, with the intermission of the years 1843, 4, 5, and 6, there being no returns of diseases published for those years.

5. *Mortality from Hooping-cough, for 8 years, 1838 to 1849 (exclusive of 1843, 4, 5, 6) throughout England.*

Year.	Males.	Females.	Total.
1838	4036	5071	9107
1839	3683	4482	8165
1840	2750	3382	6132
1841	3626	4473	8099
1842	3645	4446	8091
1847	4126	5134	9260
1848	3065	3797	6862
1849	4257	5358	9615
Total	29,188	36,143	65,331

The number of deaths for the same period throughout England from small-pox is 60,691; from measles, 63,434; from scarlet fever, 111,221. As in the metropolis, so is it in the whole of

England, that scarlet fever and hooping-cough bear the largest proportion, but the former vastly preponderates over all the others.

To the total amount from all causes for the same period in England, scarlet fever is in the proportion of 1 in $26\frac{7}{8}$, and hooping-cough 1 in $45\frac{9}{10}$. The latter is therefore more fatal in the metropolis than throughout England; for whilst in the first it is in the proportion of 1 in $29\frac{1}{6}$, in the second it is in that of 1 in $45\frac{9}{10}$.

The average of the eight years in the table above is $8166\frac{3}{8}$; if, therefore, we wish to estimate the mortality from hooping-cough for a period of sixteen years, to the end of the year 1853, from this average number it will give, as the total deaths from this cause alone throughout England, the enormous sum of 130,662 deaths!

In the report of the census for Ireland for 1841, and classified by Mr. Wilde, of Dublin, in 1843, the number of deaths registered as occurring from all causes in the ten years, 1831-41, amounted to 1,187,374.

Among the epidemic class, the total number of deaths amounted to 381,249. Out of this number there were from hooping-cough, 36,298 deaths (21,325 within the first year's age), the proportion of sexes being 100 males to 115.43 females. "It has proved most fatal in the rural districts, being there in proportion to all other diseases as

1 in 30·48, and to those of the epidemic class as 1 in 9·09; while in the civic districts it is 1 in 36·76 of the deaths from all other causes, and 1 in 14·04 of those denominated epidemic or contagious. Its general mortality, in comparison with all other affections for the entire kingdom, is 1 in 32·71, and of the total epidemic diseases, 1 in 10·5. In the metropolis, this affection was to the total epidemics, 1 in 17·47; in the province of Leinster, 1 in 12·24; in Munster, 1 in 11·24; in Ulster, 1 in 9·4; and in Connaught, 1 in 9·1.”*

6. *Mortality in Glasgow from Hooping-cough, for 30 years, from 1783 to 1812.*†

1783	153	1793	112	1803	60
1784	13	1794	51	1804	52
1785	34	1795	180	1805	129
1786	173	1796	60	1806	162
1787	57	1797	76	1807	85
1788	17	1798	98	1808	92
1789	45	1799	95	1809	259
1790	177	1800	27	1810	147
1791	117	1801	125	1811	62
1792	68	1802	90	1812	103

Deaths in first 10 years from Hooping-cough	854	Total deaths from all causes	17,607
Second 10 years . . .	914	Second 10 years . .	16,685
Third 10 years . . .	1151	Third 10 years . .	20,184
Total	2919	Total	54,476

* Report upon the Tables of Deaths; also Review of, in Brit. and For. Med. Rev.

† Condensed from Dr Watt's Tables.

On looking over the annual mortality, during the thirty years, it will be observed how the number varies, the greatest number of deaths during one year being 259, or something more than $11\frac{1}{2}$ per cent. of the whole deaths of that year, which were 2114; whilst the lowest number of deaths is 13, the deaths of which year were 1623. This circumstance is of course due to variations in the severity of the epidemic, and to other causes subject to atmospheric influences.

The mean annual average of deaths during the thirty years, from hooping-cough, is 91.3. The ratio of deaths from which cause, as compared with the total number of deaths from all other causes, amounts to $5\frac{3}{8}$ per cent., or as 1 in $18\frac{2}{3}$.

Dr. Watt remarks as somewhat singular that, in the last twenty-five years, there had been only six single months in which some have not died of chincough; and in the last twelve years, not a month has elapsed without a death. He concludes that, next to the small-pox formerly and measles now, chincough is the most fatal disease to which children are liable.

He gives the following table of the ages at which death from hooping-cough occurred in Glasgow, during the thirty years above enumerated:—

7.	Under 6 months	in 135 cases.
	Above 6 „ and under 1 year „	357 „
	„ 1 year „ 2 years „	596 „
	„ 2 years „ 3 „ „	333 „
	„ 3 „ „ 4 „ „	186 „
	„ 4 „ „ 5 „ „	109 „
	„ 5 „ „ 6 „ „	37 „
	„ 6 „ „ 7 „ „	34 „
	„ 7 „ „ 8 „ „	12 „
	„ 8 „ „ 9 „ „	10 „
	„ 9 „ „ 10 „ „	5 „
	„ 10 „	3 „

Males, 842; females, 975 . . . 1817

Dr. Watt states that this number may be considered as about the half of the deaths in Glasgow from this cause, in which the ages were obtained.

In the year 1835, the deaths in Glasgow from the same cause were 483; in 1836, they were 454; and in 1837 they were 457; a total of 1394, of which 1298 were under five years, and 96 over that age.*

In the year 1852 the deaths were 639, and in 1853 they were 908 from the same cause, in a population assumed to be 385,000. The deaths among children under five years of age, in the latter year, amounted to—from all causes—7046, being 49·23 per cent. of the whole, or in

* *Lancet*, vol. ii., 1837-38, p. 146.

other words, one half of the whole deaths has been among children under the above-mentioned age.*

The bills of mortality in Sweden show, that in the course of sixteen years, from 1749 to 1764, the large number of 43,393 children—21,543 males and 21,850 females—have died from hooping-cough, an amount which averages 2712 children in each year.

In the year 1755, 5832 children were carried off by this scourge; but in years when it has raged with less fatality, about 1700 or 2000 were lost by it in that kingdom.†

No information has been furnished as to the cause of its origin, or of its subsequent decline.

The mortality in Sweden has been quoted most extensively by many writers as enormous for a period of sixteen years, viz. 43,393; but what is it compared to England for half that time, which presents the modest number of 65,331? Or, if an equal period of 16 years is taken for comparison, we find the really frightful number of deaths to be 130,662.

It may be presumed that the Swedish tables will not hereafter be quoted as enormous in their mortality, when the present English tables appear in their condensed form.

* London Times, 12th January, 1854.

† On the Diseases of Children. By Dr. Rosen.

8. *The following Table shows the Mortality in the same Country, Sweden, for twenty-five years, from 1806 to 1830.**

Year.	Males.	Females.	Year.	Males.	Females.
1806	2274	2272	1821	1363	1627
1807	1194	1435	1822	1149	1301
1808	276	287	1823	681	673
1809	313	315	1824	723	790
1810	435	523	1825	1043	1228
	4492	5332		4959	5619
1811	987	1155	1826	1477	1584
1812	1630	1828	1827	1244	1477
1813	953	1174	1828	979	1138
1814	461	551	1829	1031	1058
1815	532	642	1830	1015	1130
	4563	5350		5746	6382
1816	792	839	1806-10	4492	5332
1817	947	1123	1811-15	4563	5350
1818	598	747	1816-20	3856	4523
1819	810	991	1821-25	4959	5619
1820	709	823	1826-30	5746	6382
	3856	4523	Total	23,616	27,206

Giving a total of 50,822 deaths in the 25 years,—23,616 males, and 27,206 females ; or an annual average of $2032\frac{7}{9}$ deaths.

The Reports of the Council of Health for the City of Paris represent the mortality from hooping-cough to be, in

* Brit. Med. Almanack, in Sixth Annual Report of Registrar-General.

1827	.	.	54 boys	.	.	64 girls	.	.	total	118
1828	.	.	78 „	.	.	82 „	.	.	„	160
										<hr/> 278

The total number of deaths from all causes in 1827 was 23,241, and in 1828, 24,299. The proportion of deaths from hooping-cough to that from all causes is 1 in 171.*

But it appears that in those years, in 1827, the number of 756 boys, and 736 girls, died from convulsions; and in 1828, 889 boys, and 852 girls, died from the same cause. The greater number of these were in the three first months of life, and from the first to the fourth year of age, and which may account for the remarkably small mortality from hooping-cough.

In Prussian Pomerania, the deaths were as 1 in $25\frac{1}{2}$ of the entire mortality.

In Denmark, as 1 in $21\frac{1}{2}$.

In Brandenburg, as 1 in $29\frac{1}{2}$.

In Sweden and Finland, 1 in $13\frac{1}{2}$.

In Strasburgh, 1 in 94.

In London 1 in $29\frac{1}{6}$; in England, 1 in $45\frac{9}{10}$.

In Ireland, 1 in 32·71.

In Glasgow, 1 in $18\frac{2}{3}$.

In the city of Philadelphia, with its suburbs, the deaths from hooping-cough, for a series of twenty years, viz. :—from 1st of January, 1807, to

* Amer. Jour. Med. Sciences, vol. iv. p. 528.

1st of January, 1827, inclusive, were 805. The highest number in a single year is 151, in 1819; the lowest 6. The whole amount in twenty years, 805, is as 1 in 22 of the whole number of deaths under puberty, from other diseases.*

9. *Mortality from Hooping-cough in the City of Montreal, for the years 1846 and 1847, and first quarter of 1848, with a population of 48,000.*†

Year.	Males.	Females.	Total.	Under 1 year.	Between 1 and 3.	Between 3 and 5.	Between 5 and 10.
1846	9	14	23	9	11	2	1
1847	3	4	7	6	1	0	0
1848	8	8	16	12	2	1	1
	20	26	46	27	14	3	2

Total deaths from all causes in 1846 . . 2118

Ditto „ „ 1847 . . 3005

Ditto first quarter in 1848 . . 375

5498‡

The mortality from this disease, as compared with the general deaths is 1 in 119½, or not quite seven-eighths per cent. The amount is ridiculously small, and must be incorrect, as the returns were not made by medical men, and almost every com-

* Med. Statistics of Mortality in Philadelphia. By Dr. Gouverneur Emerson.

† The population now is 75,000.

‡ Brit. Amer. Med. and Phys. Jour.

plaint with the slightest cough is put down by the French-Canadians as “la phthisie,” when it is notorious that a large number of these were cases of pertussis. These were the only tables compiled to my knowledge. I think I may safely pronounce the mortality to be 1 in 30.

In Boston	the mortality is 1 in 82	
In Charleston	„ „	1 in 46·6
In Baltimore	„ „	1 in 95·38
In New York	„ „	1 in 64·7
In Philadelphia	„ „	1 in 63·1*

* Condie, On Diseases of Children, p. 329.

CHAPTER IV.

SYMPTOMS OF SIMPLE HOOPING-COUGH.

THE disease has been divided into three stages by some, and into two by others. Desruelles and Lombard have a period of invasion, a period of increase, and a period of decline; Blache and Williams divide it into the inflammatory, congestive, and nervous stage; Dr. Golding Bird into inflammatory and nervous stage; Dr. Churchill has adopted a catarrhal and spasmodic stage; Aberle into catarrhal, convulsive, and period of decrease; and Dr. West recognises three stages, the catarrhal, spasmodic, and the period of decline. I think the two last the most convenient, for many reasons, and will, therefore, adopt them.

1st stage—Catarrhal.

2nd stage—Spasmodic, nervous, or convulsive.

3rd stage—Period of decline.

The *first stage* of an attack of hooping-cough usually begins with symptoms of catarrh, seldom so severe as that preceding measles, and presents at first little or nothing to distinguish it from a common cold; the child is languid, restless, feverish,

and irritable without cause. There is loss of appetite, sneezing, coughing, turgescence of the face, slight redness of the conjunctiva, watering of the eyes, and an extra secretion of mucus from the membrane lining the nose and bronchial tubes after the first day or two. Sometimes the cough is attended almost from the outset with a peculiar ringing sound ; it is more or less frequent, comes on in fits, is at first dry, but with profuse expectoration afterwards, and may be taken for a common catarrh, or catarrhal affection of the trachea and bronchi.

This is the most general mode of invasion—a well marked but not very severe catarrh. Occasionally we find the patient suffering much more ; the fever intense, great thirst, the pulse quick, the oppression and general distress considerable, the cough very frequent and painful, a sense of constriction in the chest, and a feeling of weight in the head. The anterior part of the neck is sometimes uneasy, or even painful ; the bowels are generally out of order. The cough is more sonorous and more acute than in bronchitis ; expectoration is scanty, even with adults, and the matter brought up is limpid, as at the commencement of catarrhal affections.

There is scarcely any fever, sometimes only for twenty-four or thirty-six hours ; but in some cases,

the fever is more marked, and may assume a quotidian or tertian type.

Occasionally there may be no evidence of the existence of a first stage, as mentioned by Dr. Churchill; the child is at once seized with the characteristic cough, without any irritation of the mucous membrane.* An example of this occurred to the child of Dr. Tavernier, aged two years, who was brought home from the country without the slightest cold. The next day she was playing with children who had the disease, and on the evening of the second day she had an attack of shrill spasmodic cough, which proved to be whooping-cough, and continued for two months without any complication.†

On the other hand, Dr. Roe says‡ that very mild cases of this disease retain the character of unusual expirations, followed by a forced inspiration, throughout their whole course, and the hoop may never be heard. He has met with several instances in which one child in a family who were suffering from distinctly-marked whooping-cough, went through the disease without whooping, and others in which the hoop was never heard more than

* Diseases of Children, p. 200.

† Diet. Gén. des Sciences Med. Art., "Coqueluche," p. 24.

‡ Treatise On Whooping-cough, p. 8.

once. Dr. Watt mentions that he had met with similar instances,* and refers to observations made by Dr. Cullen and Dr. Burns to the same effect. The former writes, "I have had instances of a disease which, though evidently arising from chincough contagion, never put on any other form than that of common catarrh."† Dr. Burns observes, "In young children, even death may take place, although the disease never fully forms;" and his observation is confirmed by M. Duges. Were this more generally known among parents, that the disease may exist unaccompanied by a *hoop*, they would not wait till this symptom appeared before they made any attempt to arrest its progress, particularly when hooping-cough is reigning as an epidemic disease. Dr. Churchill, however, thinks that in such cases there must ever remain a doubt as to the true nature of the disease.

The catarrhal symptoms constitute the period of incubation, and usually continue from four to twelve or fifteen days, when they subside gradually into the second stage.

The average *duration of the catarrhal stage* of hooping-cough in 55 cases under Dr. West's care,‡ in which the date of the occurrence of the first distinct hoop was ascertained, was 12·7 days. In

* On the Chincough, p. 37.

† First Lines of the Practice of Physic.

‡ Lectures on Diseases of Infancy and Childhood. 2nd edit.

19 of these cases, the first hoop was heard within 7 days from the commencement of the catarrhal symptoms, and in 19 more cases during the succeeding seven days ; but the extreme limits of the duration of the premonitory stage are very wide apart—since on one occasion it lasted only two days, and in another 35 days.

In 18 cases, Dr. West remarks, the catarrhal stage lasted on the average only 8·3 days, when the cough assumed a distinctly paroxysmal character ; but no hoop occurred till the fifteenth day. In four cases, after the catarrhal stage had lasted on the average 11·5 days, the cough became paroxysmal, but no hoop occurred during the whole course of the affection. In one case the cough had a distinctly paroxysmal character from the first, but no hoop occurred during the whole course of the affection. In six cases the cough was paroxysmal from the outset, and continued so on the average 9·3 days, at the end of which time distinct hoop accompanied it. In three cases a distinct hoop attended the cough from the commencement.

Unusual protraction of the catarrhal stage of hooping-cough is, Dr. West believes, usually met with either at the commencement of an epidemic of the disease, or towards its close. Epidemic hooping-cough very frequently succeeds to epidemic catarrh ; the former disease becoming gradually

developed out of the latter, and the persistence of the cough in several cases long after the decline of all other indications of catarrh, is often one of the first signs, he says, of the commencement of an epidemic hooping-cough.

The *second stage* is known by the gradual abatement of most of the catarrhal symptoms ; the fever and other disturbance to the child's health diminish, or altogether cease, but the cough, nevertheless, continues. It may even appear aggravated, but its character is changed. It is no longer a simple cough, with few succussions, but is prolonged by a succession of expiratory efforts ; and at its termination is occasionally heard a forcible inspiration, accompanied by a loud ringing sound. The prolonged paroxysm of coughing, or *kink*, and the *hoop*, mark the commencement of the present stage, as the subsidence of the catarrh does the termination of the first.*

The cough is so remarkable that, when once heard, it is seldom either mistaken or forgotten. "It grows louder and lasts longer than before, and assumes something of a suffocative character, in all of which respects a tendency to exacerbation towards night becomes early apparent. As the cough grows severer, its peculiarities become more and more manifest ; during each paroxysm the child turns red in the face, and its whole frame is

* Churchill, On Diseases of Children.

shaken with the violence of the cough. Each fit of coughing is now made up of a number of short, hurried expirations, so forcible, and succeeding each other with such rapidity, that the lungs are emptied to a great degree, of air, and the child is brought by their continuance into a condition of impending suffocation. At length the child draws breath with a long, loud, sonorous inspiration—the *hoop* from which the disease derives its name, and the attack sometimes terminates. More often, however, the hoop is followed by but a momentary pause, and the hurried expiratory efforts begin again, and are again arrested by the loud inspiration, perhaps only to recommence, until, after the abundant expectoration of glairy mucus, or retching, or actual vomiting, free inspiration takes place, and quiet breathing by degrees returns.”*

These paroxysms vary both in frequency and severity in different cases; sometimes coming on every three or four hours, or rapidly succeeding one another, and lasting from one to fifteen minutes; Dr. Churchill has known them occur every half hour during the day and night; in other cases, they may return every five or ten minutes during the day, and less frequently at night, though the paroxysms are rather more severe.† As a general rule, however, they are more frequent during the

* Dr. West, On Diseases of Infancy and Childhood.

† Marley, On Diseases of Children.

night than the day. In proportion to their violence and length will be the breathlessness and fright of the child, and its efforts to inspire; if lying down, it will suddenly jump up and seize hold of whatever is nearest,—its nurse, or a chair, or table, so as to make a fulcrum, as it were, for the whole muscular force of the body, which is employed in overcoming the spasm, and to diminish the shock and jar by which its whole frame is shaken.

The attack is frequently so severe that the lips and eyes become encircled with a bluish appearance: this I have occasionally observed, but am inclined to believe is more often met with in colder climates than that of England. My friend, Dr. Arnoldi, of Montreal, describes the cases of two boys, aged about ten years, living at a great distance from one another, in whom the cough was so violent, that both of them had the circumference of their eyes ecchymosed, as though they had been “pommelled in pugilistic combats.”* Dr. Von Iffland, of Quebec, also describes this bluish appearance, and mentions that not unfrequently the tongue is found to bear the same choleric tinge.† Dr. Mackintosh remarks, that it is no uncommon thing for a small bloodvessel to give way in the conjunctiva, producing ecchymosis; and he says

* Canada Med. Jour. 1852. Vol. i. p. 212.

† Montreal Med. Gaz. 1844. Vol. i. p. 194.

the straining during a paroxysm is sometimes so severe as to produce the involuntary discharge of fæces and urine.* And Dr. Copland repeats, that during the paroxysm the face and neck are swollen, injected, and violet-coloured, and the jugular veins are gorged.

Dr. Watt describes the face in one set of patients as becoming swollen and of a dark purple colour; the veins of the head and neck are distended, as if ready to burst, and the patient gasps, and has the appearance of impending suffocation. During these violent efforts, the extremities become cold, and the forehead and temples are covered with perspiration; blood is forced from the nose, mouth, ears, and eyes; in many cases, he observes, the patient is actually suffocated, falls into a faint, or is seized with convulsions. In older and more robust patients, in another set of cases described by him, the expirations are so very violent and rapid, that they look as if they would burst. The face in such cases is of a bright scarlet colour; the eyes fiery, as if they would start from their sockets; but the inspirations are performed as soon, and apparently with as much ease, as if nothing were the matter.

The appearances presented in this stage might be multiplied *ad infinitum*, according to the intensity of the attack. The duration of this, and the rapid succession of coughing, will produce the

* Path. and Prac. of Physic, vol. i. p. 403.

most severe congestion in the face and neck, approaching almost a black colour, and it is at this period sometimes that death is imminent, not from suffocation merely, but actual apoplexy.

The expectoration of a quantity of glairy mucus, or the act of vomiting, terminates the attack of coughing. The child now appears exhausted, and requires rest for recovery, the breathing being exceedingly rapid; during the interval, until the next cough, it appears as gay and lively as if nothing had been the matter with it, and returns immediately to the amusements or the occupation which the fit of coughing had interrupted. Sometimes, however, it will remain pale, thin, and languid, and seems much frightened.

The principal cause of the return of the paroxysms of coughing is the accumulation of mucus in the bronchial tubes, if the secretion is profuse. Now, as this collects, so does the child feel a tickling in the throat, and a sense of tightness, both in the larynx and chest; occasionally uneasiness or pain under the sternum: efforts are now made to expel it, and, if easily got rid of in sufficient quantity, the fit will be light and the interval easy. If it be scanty and tenacious, the paroxysm will be violent, the efforts great, and the cough renewed almost immediately, or it will occur in double paroxysms. In the early part of this stage, the mucus expelled is scanty and thin; and in proportion as

this is the case, the fits are longer and the more violent. Later, it becomes more abundant, and sometimes is very copious; at the same time, thicker and more viscid, and more easily brought up, and on that account the fits of coughing are less protracted.

The vomiting and profuse expectoration which terminate the paroxysm, cause the rejection of a rosy and limpid fluid, which comes partly from the bronchi and partly from the stomach, as shown by the presence of portions of ingesta, and of bronchial mucus. This fluid, Dr. Copland observes, in some cases may proceed from the air-passages when vomiting does not take place; in others, again, particularly in those accompanied with vomiting, it is chiefly from the stomach.* It is sometimes sanguineous, either in streaks or specks.

Vomiting is usually considered a good sign, and in its absence children are said to get worse. When it does terminate the paroxysm, the appetite is immediately keen for food. If no vomiting occurs, the expectoration in young children is scarcely ever spat out; it is generally swallowed as soon as discharged from the air passages.

I must not overlook a condition, mentioned by Sir Henry Marsh, as occurring in many cases after the paroxysm; and this he has described as "regurgi-

* Med. Dict., vol. i., p. 237.

tation.”* He has found that the rejection of food after the paroxysm of coughing was effected by the act, not of vomiting, but of regurgitation. Dr. Copland uses the term also, in expressing the non-cessation of the cough, “until the patient rejects, by a sort of regurgitation, a ropy and limpid fluid,” &c. I have sometimes witnessed after a paroxysm the apparent evacuation of matters from the stomach, without any retching at all, or any effort whatever on the part of the child; and doubtless many others have done so. On this subject, Sir Henry Marsh observes, “Regurgitation is a very remarkable irregularity, and perverted—I might say reverted—action of the nerves and muscles of the stomach. As far as my observations have reached, I have been enabled to trace it with certainty, in many instances, to the strumous diathesis, to an imperfection of function, connected, I know not how, with struma. In treatment, the knowledge of this fact is valuable.”

Mental irritation, as crying or laughter, fright, a fit of anger, opposition, or even a full meal, will generally bring on the cough. Even the sight of another in the paroxysm, from the force of sympathy, will induce it in those affected with this disease. The fits are generally much more severe after a meal, or after running, or other very active exercise, or exposure to cold. The desire for food

* Dublin Quarterly Journal, May, 1851.

is more craving than usual in this disease, and children, if not watched, will eat a great deal too much.

This stage usually continues for a considerable time, varying generally from fifteen days to six weeks or two months, but often three or four months, or even longer. I attended a child in whom this stage alone lasted fully seven months. Dr. West mentions, that in twenty-five cases, in which he watched the patients from the time when the cough first assumed the paroxysmal character, or the hoop first became audible, until the final cessation of all cough, he should be disposed to estimate the average duration of whooping-cough to be ten weeks; of which period nearly two would be occupied by the first stage; four for the second; and the cough occasionally in the third stage, to four weeks.*

The *third stage* is known as the period of decline; it may last for a few days only, or may extend to two or three months. One of the first indications of the decline is usually afforded by a diminution in the severity of the nocturnal exacerbations. The paroxysms become less frequent and less intense; they are much shorter in duration also than in the preceding period, and terminate in an easy and copious expectoration, which is thick, opaque, of a white or greenish colour, and occasionally puriform.

* Diseases of Infancy and Childhood, p. 272.

as in the last stages of catarrh; and in the vomiting of alimentary matters. The fits become insensibly feebler during this stage; the cough gradually loses the characteristic hoop, and approximates nearer that attending the last stages of catarrhal affections.

Meanwhile, if not too much exhausted, the constitution begins to recover its healthy condition; tranquil sleep restores the nervous system; the food becomes well digested from the absence of vomiting; the child recovers flesh and spirits; the circulation is quite unimpeded, and the surface of the skin assumes its natural aspect.

Occasionally in this stage the paroxysms have assumed a periodic character, returning at a given hour every day, or every two, or even three days. Dr. Mason Good mentions a case of this kind; it occurred daily at a certain hour, continued obstinately for several months, and returned at the same season for two years. Laennec remarks, that the return of the cough observes a more marked periodicity in this affection than in any other variety of pulmonary catarrh. As the disease approaches its termination, the fits sometimes reappear only on alternate days.

During this stage, the patient will remain for a day or two, or even longer, without cough; but exposure to cold, change of temperature or weather, neglect of the state of the bowels, errors of diet, or

mental excitement, will suffice in many cases to bring back the hoop, and to increase the previously diminished severity of the attack.

In particular seasons, as during autumn, and at other times during a prevailing easterly wind, the paroxysms of cough will return, with the same character, after a fortnight, a month, or even two or three months of perfect and apparent recovery.* The cough loses its spasmodic character many days before it ceases altogether; and you may even find a child, says Dr. West, otherwise in good health, who, some six weeks after an attack of whooping-cough, still has occasional returns of cough, which a slight cause would once more convert into an ailment with all the characters of fully developed pertussis. Guersent has frequently seen the paroxysms return fifteen days or a month after the cough had ceased.†

Physical Signs.—On applying the stethoscope, or the ear, to the chest during the *first stage*, we will find the mucous or sibilant rhonchi characteristic of the catarrh; and the respiratory murmur somewhat weaker than usual. The chest, also, is clear and sonorous on percussion.

During the *second stage*, when the whooping-cough is fully developed, Dr. West observes that, “If you listen to the chest during a fit of whooping-

* Copland's Dict. of Med.

† Dict. de Méd. Tom. vi.

cough, you will have no sound whatever in the lungs ; but when the hoop occurs, you will once more perceive air entering, though not penetrating into the minuter bronchi. It is not till the fit is over, and respiration once more goes on quietly, that the air reaches the pulmonary cells again ; but then you will hear vesicular murmur as clear as if nothing ailed the child, or at least interrupted only by a little rhonchus, or slight mucous râle. If the cough be severe, quiet breathing does not return, nor the vesicular breathing become audible, till some time after the paroxysm is over ; and, occasionally, short and laborious breathing ushers in each fit of coughing.”* The following is Laennec’s description :—“During the intervals between the paroxysms, only the ordinary signs of catarrh are met with, that is to say, the respiratory murmur is rather feeble, or even absent in some points, which, however, yield a good resonance ; in others, there is puerile respiration, and sometimes a little snoring, or sibilant mucous râle. During the paroxysms, on the contrary, nothing more is perceived than the concussion impressed on the trunk by the shocks of the cough, and one hears a slight degree of râle and respiratory murmur only, in the very brief intervals between the expulsive jerks of the cough ; but the whistling and prolonged inspiration, which constitute the pathognomonic character of hooping-cough,

* Lectures on Diseases of Infancy and Childhood.

appear to take place solely in the larynx and trachea. Neither the pulmonary nor bronchial respiratory sound is then heard, even in those parts of the lungs which, some seconds before and after the fit, yield the puerile respiration.”*

Dr. Williams’† observations are very similar to both of the above writers:—“On applying the ear to the chest during a fit of whooping-cough, one is surprised, with such violent external emotions, to hear so little sound of respiration within the chest; and during the sonorous back-draught there is scarcely any sound of air entering the lungs. This is to be ascribed to the continued contraction of the glottis and large bronchial tubes preventing the air from entering the pulmonary texture with sufficient force to produce the ordinary respiratory murmur.” The difference in this respect between children and adults is clearly shown by the following:—“In the convulsive cough of adults there is no obstructed whooping inspiration, but a full, forcible one, which is heard loudly in all parts of the chest.”

So far as this general description goes, all writers seem pretty much agreed when the disease is uncomplicated. Dr. Churchill, however, thinks more can be heard during the intervals in well marked cases than has been mentioned. He has examined a great many children at intervals, from one

* Diseases of the Chest. By Herbert. p. 85.

† Diseases of the Chest, 4th edit., p. 89.

paroxysm to another, and has, in a great many cases, found that after the chest had been cleared by the last cough and vomiting, the respiratory murmur or inspiration was louder and more rough than usual, nay, in some cases, that it had a rather loud, brazen sound, something resembling a loud sonorous râle, as if the air was passing through tubes narrower than usual. It is perceptible, also, in expiration, though more feeble.

This sound may continue until the mucus begins to accumulate, and then it will be exchanged for the large, mucous, bubbling sound, which increases until the next cough, and is almost universal.

In milder cases, the rough dry sound is more feeble, though generally audible, and Dr. Churchill thinks this loud rough murmur of inspiration and expiration quite peculiar to pertussis. Throughout this stage, in simple cases, the chest is clear upon percussion.

A sudden increase of fever and permanent dyspnœa are sometimes present at the commencement of this stage, and depends upon some disturbance of the nervous system, as auscultation furnishes no indication of disease of the lungs.

The most remarkable peculiarity in all these physical sounds is the inspiration or hoop precipitating the air by a loud hissing sound, as far as the bifurcation of the bronchi, where it seems to encounter some obstacle. The bronchial tubes to this

point must, during the paroxysm, be very much compressed spasmodically, in the contraction of their entire diameter.

There is one other peculiarity in this affection which has not been noticed by any writer, and which I have frequently satisfied myself of the truth of; it is this—on applying the stethoscope to the jugular veins on either side of the neck immediately after the paroxysms have ceased, a distinct musical murmur is heard, more marked on the right side than on the left, which disappears again when the circulation and respiration have become tranquil, to re-appear each time on the subsidence of the paroxysms. These venous murmurs were first observed by Dr. Ogier Ward in other diseases, but, so far as I can learn, they have not before been observed in pertussis.

In the *third stage*, many of the physical signs of the second will at times appear. But, generally, they here do not present any great difference from those of mild bronchitis, there being often variable humming, whistling, and bubbling rhonchi in the upper and middle regions of the chest.

The *expectoration* in the *first stage*, which is usually a frothy mucus, assumes in the *second stage* a very viscid and tenacious character; it may be clear and transparent, white or yellow, and mixed with air-bubbles, but still thick, tenacious, and ropy, so that it may be drawn out of the

infant's mouth with the fingers. In the *third* stage, it is very loose and more copious again, it is thick, opaque, of a white or greenish colour, and occasionally puriform, as in the last stages of catarrh.

General Considerations.—Hooping-cough is pre-eminently an affection of infancy and childhood, and has the peculiarity in common with many of the eruptive diseases, that it occurs once, and generally but once in a life-time, very few children escaping from it. Rare instances have happened where it has occurred a second time in the same individual, and some say even a third time; but this must be looked upon as doubtful. It is as unusual as the occurrence of measles or small-pox twice in the same subject. Dr. West relates, that only one instance of hooping-cough affecting the same patient more than once came under his notice. In that case the patient was a girl aged seven years, who, when three years old, had very severe hooping-cough, which lasted for several weeks, the paroxysms of cough being frequent, and the hoop loud and often repeated. In March, 1845, hooping-cough being then epidemic, she experienced a return of the disease in a very severe form, and continued to suffer from it until the end of June.

Mr. Streeter informs me that his brother, and his brother's child, have each had pertussis twice.

All ages are liable, but its most common age is between two and ten years. After the age of five

years its frequency rapidly diminishes, and after ten it becomes so extremely rare, that out of 1,367 cases in which Dr. West noticed the patients' age, he found only eleven in which it exceeded ten years. Of these 1,367 cases—

41·2 per cent. occurred during the first 2 years of life.

56·7	„	„	„	3	„
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82·9	„	„	„	5	„
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98·4	„	„	„	10	„
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It is supposed to be very uncommon in early infancy, that is, the first two months, an opinion which is generally true; Dr. Hood mentions having seen a child of a fortnight old, and Dr. Johnson has seen more than one instance of an attack in children three weeks old. Dr. Watson relates in his Lectures, that his bedmaker's daughter in Cambridge had a child ill with hooping-cough in the house with her during the last weeks of her pregnancy, and the new comer hooped the first day he came into the world.

Heberden speaks of having seen it in a woman of seventy, and in a man of eighty years of age; Dr. Roe has seen it in a lady of sixty-five. Dr. Elliotson mentions, that the last Archbishop of Canterbury had it a short time before he died. Eberlé mentions two cases occurring after fifty years. A gentleman, in Baltimore, aged 76 years, had it in August, last year.* Dr. Todd has wit-

* Vol. II., New York Illustrated News, p. 98.

nessed the disease in the persons of an old married couple, aged 80 and 72 years respectively, and who safely got through this trying malady.* In the table of the ages at which death has occurred, which I have given at page 23, in the number of 14,233 cases, 13 occurred at and above the age of 25 years, and four of these were over 60 years of age.

When an adult is attacked, it generally wants the hooping inspiration, and the same thing is said to be usually, but not constantly, observed in the cases of very young children. Dr. Elliotson speaks of the case of a lady with this disease, who always fainted instead of hooping.

Dr. West remarks, that it may be laid down as a general rule, that those cases in which the catarrhal stage is of long continuance, seldom become severe during their subsequent progress, and the same holds good with reference to the majority of those cases in which the hoop does not come on until after the cough has for some time assumed a paroxysmal character. There are, however, he says, some instances, where the long duration of the paroxysmal and suffocative character of the cough, unattended by any hoop, is a sign of the peculiar intensity of the disease, rather than of its mildness; on the other hand, the preternatural shortness of the catarrhal stage, or its total absence, is not of

* Med. Times and Gaz., 4 March, 1854.

itself any proof that the disease will be more than usually severe. This is usually observed in very young children, who are but little liable to catarrhal affections, and who are not so often attacked by hooping-cough as elder children.*

When the disease has been uncomplicated, the effects upon the child are seldom of serious importance. There may be loss of flesh and some debility, from the loss of nutrition, owing to the frequent vomiting which has disturbed digestion. The sleep, hitherto very much disturbed from the severity of the nocturnal paroxysms, which are more numerous by night-time than by day, is now much more composed and tranquil. Sometimes, however, it remains uninterrupted, the circulation has become deranged by the cough, and the skin either slightly or profusely perspires.

The duration of the three stages is from two to four months, but it is a matter of some difficulty to calculate correctly the time. Dr. West is disposed to estimate the average duration of hooping-cough at ten weeks; deduced from twenty cases, in which he had the opportunity of watching the patients from the time when the cough first assumed a paroxysmal character, or the hoop first became audible, until the first cessation of all cough. Of this period, nearly two weeks would be occupied by the preliminary catarrh of the first stage; for four

* Lectures on Diseases of Infancy and Childhood.

weeks the cough would present the characteristic hoop in the second stage; and the cough would continue for about the same period to occur occasionally in the third stage, gradually losing its paroxysmal character.

Season has a great influence over the duration, as in the warm weather of a genial spring, whooping-cough is generally milder and much shorter than during cold weather. The direction of the wind also produces a sensible diminution or increase, both in the severity and duration also. As to the longest period of its extension, it may certainly reach six or even nine months under peculiar circumstances. Dr. Dewees and others mention its continuance for twelve months, and Marley mentions a case in which the symptoms did not disappear for two years. In Chapter IX. I have given the details of a case, combined with hysteria, which certainly exceeded the last-mentioned period.

This simple and uncomplicated form of the complaint seldom destroys by its own violence. The child may die, however, from the intensity of the kinks—this is in very young children, as shown by Barrier;* it may, in short, be suffocated; I have witnessed one striking example of this, the particulars of which will be found in another chapter. The disease may also prove fatal from exhaustion, and the child die, utterly worn out, according to

* *Maladies de l'Enfance*, vol. i., p. 140.

Hamilton, Barrier, and others; or what is more common, it may lay the foundation of numerous other diseases, such as dilatation of the bronchial tubes, emphysema and oedema of the lungs, phthisis, marasmus, struma, epilepsy, ophthalmia, hernia, rickets, deafness, &c., all of which are specially considered in the chapter upon the Terminations of Hooping-cough. Dr. West mentions that a child sometimes scarcely has recovered from the struggle of a severe spasm, which has quite exhausted it, when another seizure, and then another succeeds, till one at length proves fatal.

The explanations given of the cough and the hoop by Dr. Roe, have been so much commended and considered satisfactory by writers on this disease since the appearance of his work, that I shall give them entire.

“Any one who will make the experiment will perceive that by the exercise of the voluntary muscles of respiration, he cannot either continue coughing loudly for so long a time, or empty the lungs so completely of air, as a person does in a paroxysm of hooping-cough; it must, therefore, be inferred that the involuntary muscles—namely, those pointed out by Reisseissen as connecting the extremities of the cartilaginous rings of the trachea and bronchiæ—powerfully assist in accomplishing both these objects. They seem, by acting spasmodically, to expel the air from the lungs, and to excite,

by sympathy, the voluntary muscles of inspiration ; the combined action of both sets of muscles appears to produce this peculiar cough." I hope to prove the truth of this by pathological observation, when I come to speak of the pathology of uncomplicated hooping cough, and I will go further in stating, that the spasmodic action does not only involve the smaller bronchial tubes as well as the larger, as pointed out by Dr. Churchill, but also their minute ramifications terminating into the intercellular passages of Mr. Rainey.

"The whoop takes place in the larynx and trachea, and appears to be caused by a rush of air through a contracted passage, for no sudden or violent inspiration could produce this sound in the natural healthy state of the air-tubes. The lungs are so completely emptied of air, by long-continued expirations, that a most distressing sense of suffocation is produced, to relieve which, a full inspiration is instinctively made, and at the same moment the rima glottidis is contracted, and the air passing quickly through a very narrow opening, causes the whoop."*

In the signification of the hoop as considered by Dr. West, he observes:—"Its occurrence indicates on the one hand the existence of spasm of the glottis ; and hence in those cases which are very slight it takes place but seldom, while it hardly

* On Hooping-cough, pp. 44 and 45.

ever comes on until the disease has lasted a certain time, and acquired a certain degree of intensity. It shows, however, on the other hand, that air does enter when the child endeavours to inspire; and, therefore, in cases of severe hooping cough a loud, long-drawn sonorous hoop, instead of adding to our apprehension, tends rather to quiet it, for it assures us that the spasm does not amount to actual closure of the glottis, and that, for this time at least, the child will not choke in the fit of coughing.”*

During natural expiration, the action of the heart is slightly increased over that of inspiration, as has been shown by Magendie and others; and when coughing takes place, the heart's action is further increased by the force of the expiratory movements. In hooping-cough these expiratory efforts are carried to the most extreme degree, and the blood in the air-cells, for a time at least, does not receive its supply of oxygen; we find, therefore, from these two causes, that the heart's action is tremendously increased, so much so that its palpitation is quite visible for some minutes after the cessation of the paroxysm, and the number of respirations may amount to as many as 100 per minute, the pulse during the paroxysm ranging from 120 to 200 beats. We can well imagine, when death takes place from a succession of spasmodic attacks, that exhaustion, commencing at the heart,

* Lectures on Diseases of Infancy and Childhood.

is one of the most important agents in producing it, and oftentimes inducing, as its subsequent effects, convulsions, or else fatal syncope and suffocation.

In this disease, that is, the simple form of it, there is evidently also an increase of fibrine in the blood, the result of a super-oxidation, from the increased action of the lungs and heart after each paroxysm; and when death does occur sometimes from pure syncope or suffocation, either doubtless may be produced by a fibrinous concretion in the heart being slowly, or it may be possible, suddenly, formed in that organ. This view is confirmatory of those entertained by my friend, Mr. B. W. Richardson, who has so prominently brought forward on several occasions the subject of the fibrinous constituent of the blood in relation to disease.

CHAPTER V.

COMPLICATIONS OF HOOPING-COUGH.

THE simple form of pertussis—that is, without any complication, which has just been considered—runs its course as regularly almost as any exanthematous disease, and very rarely destroys life of itself alone. The variations in its course, which have just been described, too, depend for the most part either on the greater or less intensity of the disease, or on some idiosyncrasy of the patient, or on some peculiarity in the epidemic constitution of the year.

The complications of the disease, however, are an essential element in its history, and will now come under special notice. The treatment, which is comparatively simple in their absence, now becomes more difficult and more complicated, and requires more than ordinary care and good judgment in its management. A very large proportion of the cases, during, at least, some part of their course, are complicated with other secondary affections, which are more or less numerous, and it is mostly to these that the large amount of mortality elsewhere shown is principally due.

The complications which are met with, and which I shall notice, are :—

1. Bronchitis.
2. Pneumonia and Pleuritis.
3. Congestion of the Brain, Convulsions, or Hydrocephalus.
4. Sanguineous Apoplexy.
5. Infantile Remittent Fever.
6. Diarrhœa and Intestinal Disorder.
7. Softening and Inflammation of the Stomach.
8. General Dropsy.
9. The Exanthemata.
10. Tuberculosis.
11. Pregnancy.
12. Hysteria.
13. Other complications noticed by writers.

Of these numerous complications, the most frequent and most perilous are those which it presents with bronchitis and pneumonia, on the one hand ; and with convulsions, congestion of the brain, or hydrocephalus, on the other. Their importance, too, as Dr. West justly remarks, is greatly increased by there being no period of the disease to which we can look as bringing with it any immunity from either ; but from the commencement of the cough to its complete disappearance, we are at any moment exposed to the risk of disease, either of the lungs or of the brain, converting a trivial into a most formidable affection.

1. *Pertussis, complicated with Bronchitis.*—

Bronchitic symptoms may precede the attack of hooping-cough, they may commence with the first stage, or they may subsequently come on in the second. The occurrence of the first is often met with at the commencement of epidemics of this disease, or in children, the mucous membrane of whose air-tubes may be supposed to have acquired a peculiar susceptibility from many previous bronchitic seizures. When these symptoms come on in the second stage, after the cough has assumed the character of hooping-cough, the cases are considered generally to be more serious ; this form, too, is the most common.

When they commence simultaneously, rigors and other symptoms of fever usher in the attack of inflammation of the bronchial tubes. These, in a few days, abate a little, when expectoration of frothy mucus commences, the face swells and assumes a bluish hue, and the lips become thick and dark-coloured. The breathing is accompanied with loud wheezing, and the cough is more frequent, and comes on in paroxysms, assuming the character of hooping-cough, though the hoop may be absent. The expectoration is increased in quantity, and becomes muco-purulent. At the end of four or ten days the hoop is heard, and the paroxysms recur at short intervals. If the chest is examined, percussion is found to be clear ; the ear detects the respiratory

murmur in the greater part of the lungs, accompanied by loud, sonorous, sibilant, and mucous râles; it is occasionally absent in some parts, and is again heard when the obstructing mucus is removed; these râles are as audible immediately after a fit of coughing, and during the interval, as just before the cough comes on, therein differing widely from simple pertussis. When the bronchi of both lungs are generally affected, the child is unable to lie on either side, or is incapable of lying down at all.

Should all these symptoms become very much aggravated, the cough will be more frequent and more severe, and the hoop more violent; the cough is unattended with expectoration, or if a little mucus is spit up, it is almost always streaked with blood. Though they may be very violent, the fits of coughing are not very long, and they seldom or never terminate in vomiting. The ear will here detect mucous râles through nearly the whole of both lungs. On a deep inspiration, still smaller sounds, the sub-mucous râles are heard, showing the extension of inflammation to the minuter air-tubes; and the case is one of pertussis, complicated with capillary bronchitis.

When the paroxysms are longer, as well as more frequent and violent, the patient looks as if he were being suffocated, the veins of the neck are turgid, the face and ears are livid, and the matter expectorated is purulent and frothy.

As the disease advances, the pulse becomes more frequent, weaker, and often irregular, the difficulty of breathing increases, the skin of the body assumes a livid hue, and is covered with a cold perspiration, the *alæ nasi* are alternately contracted and dilated, and there is great prostration of strength. The respirations are rapid, sometimes as many as 60 or 130 in a minute, and if, after having maintained this frequency for twenty-four or thirty-six hours, they come down to 40 or 50, the change sometimes indicates recovery, but not always. Dr. West mentions the case of a little child, two years old, whose inspirations, two days before her death, were 130 in the minute, and then on the following day they sunk to 80; but her feet were now cold, her face was livid, and her pulse very feeble. This was a case of vesicular bronchitis.

The chest is now almost motionless, a free inspiration cannot be made, and will not expand the chest, owing to the collection of mucus in the bronchial tubes, the *râle* arising from which can be heard at some distance from the patient. At length, worn out by exhaustion and dyspnoea, the child expires from suffocation, as quietly as if going to sleep.

When the attack terminates favourably, all the severe symptoms gradually cease and disappear, the breathing becomes easy and not so hurried, the wheezing diminishes, and the cough, after a period of suspension, returns. The countenance

assumes a more healthy appearance, and quiet sleep succeeds to distressing restlessness.

Exposure to cold or damp, may, at almost any period, induce an exacerbation of the cough, or a distinct attack of bronchitis. If, however, the pertussis has already lasted for some ten days or a fortnight without having presented any grave features, such intercurrent bronchitic seizures are usually very tractable.

Barrier states that cases sometimes occur in which we could very easily believe in the existence of phthisis, which was not present. A child, for instance, who had been emaciated and weakened by an attack of pertussis of long standing, in whom there would be an abundant fluid secretion in the bronchial tubes, attended with a true gurgling sound; and if the expectoration was purulent, a case far from being of rare occurrence, we might believe that there were caverns in the lungs. The mistakable symptoms which might be observed are due, he says, to dilatation of the bronchial tubes—a termination which I shall consider in a future chapter.

Pertussis may be confounded with bronchitis and bronchial catarrh, when accompanied with spasmodic cough. Valleix gives the following as the distinctive signs between the two:—*

* *Résumé Générale de Path. Interne.* Par F. J. L. Valleix. 10 vols. 1842-47.

Pertussis.

Commences with catarrh.

Fits of coughing terminate with whistling inspiration, tenacious expectoration and vomiting.

No fever in uncomplicated cases.

Respiration natural; the normal respiratory murmur being heard in the intervals between the fits of coughing.

Only occurs once in the same subject.

Symptoms intermittent.

Acute Bronchitis with spasmodic cough.

Commences suddenly, often with cough.

Fits of coughing less severe; no whistling inspiration, tenacious expectoration or vomiting.

Much fever at the commencement.

Different *râles* in the chest.

May attack persons frequently.

Symptoms continuous.

2. *Pertussis, complicated with Pneumonia and Pleuritis.*—This disease very frequently supervenes, and destroys a great number of children. It is an affection not so easy of diagnosis as in the adult, the physical signs not being the same in the preciseness of their character; it is more common in the second stage of pertussis than in the first, and usually attacks children of a plethoric or full habit of body. I believe, however, that the children of the poor who possess the reverse of this state, are peculiarly liable to this form of complication; who are much emaciated, and suffer from debility, one, indeed, which in the majority of cases becomes fatal, unless the treatment is commenced before

the inflammation is established, or at the onset of its invasion.

The symptoms will vary according as the pneumonia and pertussis are coeval affections, or as the one may supervene upon the other. Again, the pneumonia may follow upon an attack of bronchitis in pertussis, the minute bronchi becoming involved in the inflammatory mischief, and bronchial breathing and dulness on percussion may reveal, during the patient's lifetime, the nature of the mischief which will be disclosed after death.

The presence of pneumonia in the first stage may be suspected by the greater amount of constitutional disturbance, the quick pulse, high fever, loss of appetite, dyspnœa, and increased cough. These, aided by percussion and auscultation, will most probably establish the fact.

During the second stage, when the catarrhal fever has subsided, the occurrence of pneumonia will generally be marked by the return of fever, loss of appetite, increase of the cough, and the addition of difficult or hurried respiration during the intervals, as well as by constitutional disturbance in proportion to the intensity of the disease.

In some cases, however, the inroad of the disease is so very gradual, and marked by so few symptoms, that the child is often beyond the reach of human aid, unless we have been sufficiently watchful to detect it.

The observance of the following symptoms—as laid down by Dr. Copland, Dr. Churchill, Billard, Dr. Roe, and other writers—will lead to a correct diagnosis of this complication.

In addition to the symptoms of fever, &c., which have been already described as likely to occur in the first and second stages of pertussis, we shall find, when the affection of the lungs and pleura is present from the commencement, the cough occurs frequently in short paroxysms, and is seldom followed by the rejection of the contents of the stomach. The pulse is quick and hard, the respiration hurried, the nostrils and diaphragm labour much during respiration, and the cough is without the attendant hoop, and does not terminate in vomiting as the complication becomes developed. The expectoration, if there be any, is swallowed, if the child is a very young infant, or is under five years of age: it is in general not peculiar up to that age. Over that period, from five to fifteen years of age, it may be observed rusty in character, or thick, opaque, gelatinous, or puriform. But this last condition of the sputa is observed in pneumonia, consequent upon the bronchial complication, with the addition of wheezing and difficult expectoration.

Very often the cough is not accompanied with pain in the chest, but sometimes it is found circumscribed, if the child is old enough to complain.

At other times it is diffused and obscure. If the child should be an infant, pain may be suspected, by the action of its hand frequently touching or passing over some particular spot on the chest.

There is more or less dyspnœa, but this, I will observe, must not be taken as a sign of consequence alone, as it is observed now and then in the simple form of hooping-cough. It is, however, when pneumonia is present, greater, as Barrier remarks, than in adults, and the respirations may increase from 40 to 60 per minute, a frequency which would require extensive disease to produce in the adult. The respirations therefore are short and rapid. The pulse becomes very quick from the beginning, seldom under 120, even in cases where the distress does not appear very great; but it often exceeds this, and may reach 140, 160, or even 180, especially with young children. At the commencement it is pretty full and strong, and in favourable cases it gradually becomes softer and slower; but in unfavourable, it preserves its frequency, becomes extremely small, irregular, and at length insensible. The skin bears a relation to the rapidity of the circulation, being hot and dry at first, and afterwards cool and clammy.

The *physical signs* are of great importance, even though they may not be quite so definite and certain as in adults. The dulness on percussion is only present over the diseased portion of the lung,

but resonant in other parts. Now, should it assume the form of lobular pneumonia, which is very uncommon in young children, this dulness will be really difficult to detect until the disease becomes more advanced, and a portion of the lung becomes solidified; then we may expect absolute dulness. In the early stage of lobular pneumonia, a very careful examination of both sides of the chest will be absolutely necessary to determine with exactness the points in which the sound is dull.

Barrier states that, in "disseminated lobular pneumonia," the results of percussion are completely negative, and that there is no dulness, unless from some complication.* According to both Drs. West and Churchill, there is a manifest dulness usually most evident in the infra-scapular region. If this is absent, the lower parts of the chest yield a somewhat duller sound than the upper, and the impression communicated to the finger is that of greater solidity below than above the scapulæ.

The stethoscope will now detect, in this early period of the inflammation, a soft sub-crepitating râle, which, according to Rilliet and Barthez, is the only sound to be heard throughout the course of the disease. But, in this disseminated or partial form of the disease, we find also an occasional mixture of the sibilant, as well as the sub-crepitating and mucous râles. It is generally heard at the

* *Mal. de l'Enfance*, vol. i., p. 105.

back of the chest, sometimes in front, and at different points, according as the lobules affected may be distant or near.

The true crepitant râle is much rarer in infants than in adults ; but it may occasionally be audible for a few moments. If one lung be affected, we shall find the sub-crepitant râle on one side, and puerile respiration on the other ; but if both be affected, we may overlook the disease, owing to the absence of contrast, unless the disease of one lung be so far advanced as to give rise to bronchial breathing, whilst in others nothing but the sub-crepitus can be detected.

If the inflammation has spread, and involves more than a few lobules which have coalesced, and the lung is in a more generally solid condition, we find bronchial breathing in one or both lungs posteriorly, both in expiration and inspiration, and even bronchial râles and bronchophony. The sub-crepitant râle has changed a good deal, the bubbles are smaller, and the crackling much finer.

The more defined phenomena of pneumonia are masked occasionally by the great amount of moist râles ; but even these have a sort of metallic sound in this disease, which, taken along with the vocal resonance, and the dulness on percussion, may prevent an error in our diagnosis.

If the child live until suppuration be established, which is very seldom the case, there may be heard

a large mucous bubble, or a large crepitus, with, perhaps, cavernous respiration, and the dulness on percussion may diminish. This complication, however, often terminates unfavourably in a short time. During its continuance, the hooping-cough presents characters much less distinct, but which become more pronounced as the inflammation is subdued, and the complaint will pursue its usual course. We may rejoice to hear, in fact, the nervous elements of hooping-cough return, the well known hoop, because it is a favourable symptom, and denotes a favourable disposition towards the cure.

Barrier remarks, that pneumonia complicated with pertussis, is a much more serious disease than pneumonia alone. Of twenty-eight cases, ten were complicated with pneumonia, and proved fatal. Three cases out of the ten had convulsions previous to death; he, therefore, does not consider in these that pneumonia was the immediate cause of death.

These two complications, bronchitis and pneumonia, appear to be the most common in this country; and, I may say, they are also the most frequent, during the cold season, in Canada; of the two, I have met with more cases in which bronchitis was the complication. Of twenty-seven cases under Dr. West's care, thirteen died from bronchitis or pneumonia.* The forty cases, variously complicated, which M. Blache examined, presented the

* Lectures on Diseases of Infancy and Childhood.

complication of lobular pneumonia twelve times, and inflammation of the bronchi ten times. In twenty-eight cases observed by Constant, ten were from inflammation of the pulmonary parenchyma.* Dr. Copland attributes the frequency of these complications to the prevalence of easterly and northerly winds, and the variable climate of these countries.†

Age has little to do with the complications now described. They are met with in children of all ages, but most frequently from one to six or seven years, and often creep on very insidiously, so as to deceive the physician as well as the nurse, unless the proper precaution of auscultating the chest very frequently is adopted. On this point, Dr. Churchill remarks, "I would strongly recommend that this should be done at each visit, as a matter of duty, in all cases of hooping-cough, and minutely and thoroughly whenever we suspect the existence of more than the simple affection."

Here is the proper place to refer to the dulness which frequently arises from the collapse on carnification of some of the lobules, and which has been frequently mistaken for hepatization. The diagnosis will be much assisted by observing the absence of the usual signs of pneumonia—such as the

* Dict. des Dicts., Art. "Coqueluche."

† Medical Dictionary. p. 238.

constitutional disturbance, the quick pulse, fever, dyspnœa, and increased cough.

But we must not overlook the fact, altogether, that lobular pneumonia does occasionally arise in the progress of the affection, as well as the lobar form, the distinctive features of which have been described.

CHAPTER VI.

COMPLICATIONS OF HOOPING-COUGH, CONTINUED.

3. *Pertussis, complicated with Congestion of the Brain, Convulsions, or Hydrocephalus.*—The complication of serious disorder of the nervous system is almost as frequent as its association with grave mischief in the lungs and air-tubes, and even more dangerous and perplexing. We might anticipate their occurrence, even before experience had proved the fact. “If we watch a child,” observes Dr. Churchill, “during a paroxysm of whooping-cough, and notice the great congestion of the vessels of the head, face, and neck, during the fit, and observe how often this is repeated during the day, for weeks together, and remember the delicate condition of the brain in young children, and especially in infants, our wonder will be, not that the cerebral affections occur at all, but that they are not more frequent.”*

These attacks, experience has shown, may occur at any age, particularly in young infants, about the period of dentition, or from six months to two or three years of age. In these, various forms of con-

* Diseases of Children, p. 208.

vulsions, spasm of the glottis, screaming, and other peculiarities, are of frequent occurrence, and indicative of this complication, which is often more prevalent in some epidemics than in others. They are exceedingly dangerous, and often become fatal; the testimony of some writers, however, is to the effect, that they rarely carry off the patient. Dr. West mentions that fourteen of his twenty-seven fatal cases died from congestion of the brain, convulsions coming on in a fit of coughing, or from hydrocephalus. All who have had much experience, says Dr. Churchill, will admit the rarity of cure, and the rapidity with which they run on to a fatal termination. So far as my own experience goes, I have looked upon them as the severest complications which we meet with in whooping-cough, and necessarily require the utmost energies of the physician.

No period of the three stages is exempt from their influence: they may accompany the disease at its commencement, or may arise therefore at any part of its course. Dr. West most properly remarks—"The nervous system sometimes suffers so severely from the very first, that death takes place almost before the disease has had time to assume its usual characters. At other times whooping-cough comes on naturally; its two elements, the bronchitic and the nervous, if I may be allowed the expression, increase daily in intensity, till all at once the

symptoms of the former recede, and are almost lost in those of the latter, which in a day or two bring on the fatal termination of the case. Or lastly, no symptoms referrible to the nervous system call for our solicitude until after the hooping-cough has continued many weeks; but then the long continuance of the disease seems to excite mischief in the brain, and death overtakes the patient when we had already begun to hope that nothing more than time was needed to perfect his cure.”*

The following circumstances may lead us to fear the supervention of convulsions:—

The tender age of the child, from seven months to two years of age; the paroxysms becoming suddenly increased in violence and severity, without any of the former complications; producing congestion of the brain, and subsequent drowsiness, which, if followed by convulsions, are succeeded by fatal coma.

Carpopedal contractions, or flexures of the thumbs, on the palms, and the great toes drawn apart from the others; with attacks of spasm of the glottis, from excitement of the spinal system of nerves.

Lividity after each fit of coughing, and remaining in that condition longer than usual; the pupils becoming dilated; with a sudden arrest of the hoop, an absence of vomiting, and no apparent accession of bronchial inflammation.

* Lectures on Diseases of Infancy and Childhood.

Swelling of the top of the fingers and toes, noticed by Dr. Kellie, of Leith, either of itself alone, or combined with other conditions.

The previous occurrence of nervous affections, any hereditary taint, or the occurrence of convulsions in other members of the family.

Now, should convulsions arise from these various conditions, they may be of short continuance, leaving the child in a state of stupor, to be followed again in a little time, on the mere effort of coughing, by a fatal convulsive seizure. At another time the cough may not return, but convulsions recur independently of it, and the child die in twenty-four or thirty-six hours from their first occurrence: or the child may completely recover, without a recurrence of a second attack. Sometimes, again, a convulsion may occur in one of the paroxysms, and carry off the child when the physician is the least prepared for it, and where there may be an absence of any dangerous symptoms to account for its sudden appearance.

Instead of convulsions, fits of temporary asphyxia, which are not infrequent, and which have been mistaken for convulsions, sometimes instantly carry off the child.

When death occurs from a fit of convulsions, after a paroxysm of coughing in severe pertussis, it takes place as the result of spasmodic closure of the larynx, and consequent congestion of the brain.

You watch for a few moments, remarks Dr. West, the fruitless expiratory efforts of the child, and then all is over, just as in many fatal cases of spasmodic croup. The relation between hooping-cough and spasmodic croup, indeed, is sometimes very apparent; and you may observe, he says, after some unusually violent fit of coughing, the thumbs drawn into the palms, the hand flexed on the wrist, or the great toe drawn apart from the others. At first, probably, the symptoms will be slight, and will soon pass away; but their import, he truly remarks, is most serious.

It may be of importance to determine, whether the convulsions depend upon disease commencing, or already existing, in the brain. Should they affect one side of the body more than the other, and especially if one side or limb be paralyzed, softening of some of the more central parts of the brain and serous effusion may be inferred. If not one-sided, as they rarely are, and should they be attended with spasms, they are indications of disease of the substance or membranes, and may terminate in softening or in serous effusion either into the ventricles, or at the base of the brain, and in their subsequent course produce hydrocephalus. They do not necessarily constitute an existing state of disease in the brain, for we know congestion will produce them. But it is almost certain, however, that if they continue for any length of time without

proving fatal, they will terminate in hydrocephalus. Dr. West has shown that the long continuance of hooping-cough, and its excitement of the spinal nervous system, will give rise to the development of acute hydrocephalus.

To consider some of the symptoms which may indicate disease of the brain, probably some of the earliest will be an unusual sleepiness and heaviness after the fits of coughing, with an uncertain look of the eyes, or a stare, or spasmodic twitchings of the extremities, or carpopedal spasm. Supervention of dyspnoea, or the sudden aggravation of difficulty of breathing which had existed previously; this is one of the earliest indications of severe affection of the nervous system, according to Dr. West. Increased irritability of the stomach, which becomes almost unable to retain food or drink, is sometimes the *first* indication that the head suffers. Dr. West attaches great importance to this, and remarks that if it should persist for above twenty-four hours, and not be referrible to the remedies employed, nor to gastric disorder, it should always excite our solicitude, and direct attention most anxiously to the head.

If to the foregoing be added the supervention of fever, with pain in the head; a fixed and brilliant, dry eye; unusual redness or palor of the face, and torpid bowels, added to aversion to light and noise, grinding of the teeth, or sudden starting or shocks

of the body in sleep, with rolling or tossing of the head, moaning, and screams; we have manifestations, without convulsions, of irritation of the brain or its membranes, which may soon produce organic mischief or effusion.

If there be stupor or coma, without convulsions, also, we may feel equally anxious.

After a child has been attacked with convulsions, the hoop often ceases, and returns when the head is relieved; but when hydrocephalus has taken place, both cough and hoop always cease, and the child lies in a state of unconsciousness.

The approach of hydrocephalus, Dr. Johnson observes in these cases, has been occasionally overlooked, in consequence of mistaking the laborious respiration arising from oppressed brain, and considering it to be the effect of bronchial inflammation. The assistance of the stethoscope would be here most valuable, but unfortunately the restlessness and crying of young children renders its application in many cases difficult, if not altogether impossible, and we are often obliged to form our opinion from the character of the breathing. In hydrocephalus, the breathing is not permanently quick; it is irregular and sobbing: occasionally the child sighs heavily, expanding the chest in a manner that never takes place in inflammatory affections of that cavity.*

* Cyclopæd. of Pract. Med., vol. i., p. 431.

We have thus seen how meningitis, hydrocephalus, organic disease of the brain, and other nervous affections, may creep on most insidiously, until they become manifest by some of the usual symptoms of these affections, or suddenly even present themselves with scarcely any warning whatever. Dr. West saw a considerable degree of stiffness of the whole spinal column precede, for twelve hours, the death of a little boy, who fell a victim to hooping-cough thus sadly complicated with disorder of the nervous system.

He gives a striking example of the insidious manner in which tubercular meningitis may come on during hooping-cough, and prove fatal, without affording an opportunity of suitable treatment. This will be found at length in the complication of tuberculosis with pertussis, in Chapter VIII.

The progress and course of these complications, which are most ably considered in Dr. Churchill's work, independent of their connexion with pertussis, will be partly modified by the presence of the cough, as a permanent exciting cause, partly by the influence they in turn exercise upon the cough, and partly by the state of the health of the child. They are described as even more unmanageable than in their ordinary form, in consequence of the repeated cerebral congestions; they may diminish the frequency of the cough, but not its violence; or, by increasing the force of the spasm, produce death

by suffocation—the result of the sudden closure of the larynx. Or, if the child's constitution is harassed and broken down, from a long existing pertussis, it will offer but little resistance to the secondary attack.*

Notwithstanding all these, however, it does seem remarkable that sometimes children do escape with the most perfect impunity, whose cough is so violent, and cerebral congestion apparently threatening, that it forces blood from the eyes, ears, and nose. Whilst other children, again, are speedily attacked with affections of the head, whose cough is so slight as to attract but little attention.

When pertussis prevails epidemically, it often becomes complicated with one form of disease in a large number of cases; this is the case with convulsions, sometimes. An epidemic which reigned at Copenhagen, in 1775, was remarkable from convulsions attacking so many infants. The same thing was often remarked by Ludwin, during an epidemic of pertussis, which reigned at Laugen-Saltz in 1768 and 1769. During the epidemics of 1780, at Erlangen, pertussis was complicated by a nervous fever, with delirium, convulsions, and other cerebral affections, which destroyed a large number of children.†

* Diseases of Children, p. 209.

† Barrier, *Mal. de l'Enfance*, vol. i., 148.

4. *Pertussis, complicated with Sanguineous Apoplexy.*—Immediately after birth, or at any period of subsequent childhood, cerebral hæmorrhage may occur, under the influence of causes that favour congestion of the brain, or even, it may be remarked, independently of any cause that we can discover. It cannot, therefore, surprise us to find, says Dr. Churchill, in a disease involving such frequent congestion of the vessels of the head, that occasionally cases occur in which the vascular fulness produces not merely convulsions, but a true apoplectic attack.

“The same result may take place from a higher degree of pressure, under which the texture of the vessels gives way, and effusion of blood takes place between the membranes, or into the cerebral substance.”

Although, from the repeated force of the cough, this may appear as a natural result of the pressure exercised upon the brain in this disease, so far as general experience goes, it does not seem to be a frequent complication, unless we suppose, with Dr. Churchill, that the sudden deaths on record are really such cases. It is mentioned by Marley,* Dr. Watson,† Dr. Gurney Smith,‡ and others.

* Diseases of Children, p. 159.

† Lectures on Practice of Physic, vol. ii., p. 65.

‡ Compendium of Medicine, &c.

Heberden, in describing the violent manner in which adults are attacked with the kinks, says, "they fall down instantly, as if in an apoplexy."

The following case from Barrier illustrates the mode of attack, and, in some degree, countenances the observation of Dr. Churchill, above, that some, at least, of the sudden deaths may have been owing to sanguineous apoplexy:—

"Claude Charmillon, a child seven years old, had suffered six weeks from hooping-cough when admitted into the Hôpital des Enfants, May 5, 1838. The first stage had lasted about fifteen days, and for a month past the cough had been accompanied with hoop, and followed by vomiting of glairy matters, more frequent during the night than the day, free from complications, and the condition good during the intervals.

"During the first few days he was under M. Barrier's observation, the cough was forcible and frequent, sometimes followed by epistaxis. Auscultation gave evidence of fluid in the bronchial tubes.—May 9. The patient, being feverish, was bled.—May 10. Considerable catarrh.—May 11. Slight eruption of scarlatina. After this the eruption continued quite as usual, but the bronchitis increased, and the bleeding was repeated, with benefit. But the patient became emaciated, and phlebitis set in where the vein had been punctured, and two abscesses formed in the fold of the arm.

The whooping-cough had evidently diminished, when, in the night of the 31st May, the patient died suddenly, after a severe fit of coughing. On making a *post mortem* examination, the lungs were healthy, the bronchial mucous membrane inflamed. The smaller bronchial tubes were dilated, and filled with frothy mucus. The bronchial and thymus glands, the head, and abdominal viscera, were healthy; but on opening the cranium, a great effusion of blood was found in the cavity of the arachnoid, covering the convexity, and also at the base of the right hemisphere of the brain and cerebellum, with some blood infiltrated between the pia mater and arachnoid of the same side.”*

The symptoms of cerebral hæmorrhage in pertussis, in the child, are extremely obscure; and one good reason for this is, that the hæmorrhage almost invariably takes place into the arachnoid cavity; and blood is sometimes poured out there in very large quantity, but it is so generally diffused over the surface of the brain, that the pressure which it exerts over that organ is nowhere very considerable. The special symptoms, then, which ought to excite alarm, are a continuance of the congestion about the head and face, unusual drowsiness; the sudden occurrence of violent convulsions, and their frequent return, alternating with spasmodic contraction of the fingers and toes in the intervals. We may

* Mal. de l'Enfance, vol. i., p. 142.

find, also, that the attack will either occur suddenly, proving instantly fatal, as in Barrier's case, or the drowsiness may degenerate into stupor and coma, equally fatal, but less rapidly so.

Fortunately, this complication is not a frequent one, as it is in all cases a most dangerous and fatal one.

In tubercular hydrocephalus, which is occasionally met with as a complication of pertussis, as Dr. West has shown, the form of *capillary apoplexy*, may possibly present itself, but only noticeable after death, as it is seldom extensive, and has but little share, probably, in hastening a fatal termination. Small effusions of blood will be found in these cases, in the midst of the softened cerebral matter which surrounds the deposit of tubercular disease of the brain.*

* Lectures on Diseases of Infancy and Childhood, Nos. 4 and 22.

CHAPTER VII.

COMPLICATIONS OF HOOPING-COUGH, CONTINUED.

5. *Pertussis, complicated with Infantile Remittent.*—Although this is not so formidable a complication as those which have been already described, it however often renders the affection very troublesome, and of tedious duration, and adds much to the annoyance of the physician. Dr. Churchill thinks, in our anxiety about the principal affection, we are liable to neglect the condition of the stomach and bowels, which is known to be variable in whooping-cough, in their being either pretty regular or much disordered. He observes that, during the first stage, the effect upon the concurrent disease, and upon the infant, may be comparatively slight; but in the second stage, when the constitution is somewhat shaken, it may prove more serious, and require great attention and prompt treatment to prevent it running on into infantile remittent and its consequences.

Should the bowels be in a disordered condition, it will be marked by a foetid breath, a foul and loaded tongue, appetite impaired, tumid or tym-

panitic abdomen, and unhealthy and offensive evacuations. The complexion is lost, and the eyes appear more sunken and heavy than in health.

“After the symptoms just enumerated have continued for a longer or shorter time, the fever makes its appearance, sometimes commencing with a rigor; more frequently, however, it comes on so gradually, that we do not know precisely when to date its commencement. The paroxysms of coughing become more frequent, and the breathing is quickened and oppressed; but still it may be, with a little care, distinguished from the attack of bronchial inflammation. The stethoscope affords us useful, though negative, evidence. The usual symptoms of bronchial inflammation are absent. The frequency and force of the respiration are found increased, but this increase is not accompanied by any *râle* indicative of bronchial inflammation; while the daily remissions, the loaded tongue, the nature of the alvine discharges, the aspect of the child, constantly picking his nose and lips, all serve to determine the true character of the disease.”*

So gradual, and sometimes so insidiously, does the fever steal onwards, that its approach may escape notice; rigors, though rare, will now and then very distinctly usher in the fever. Unlike that also which accompanies hydrocephalus, it has a distinct remission in the morning, and an

* Dr. C. Johnson, *Cyc. of Pract. Med.*, vol ii., p. 430.

exacerbation towards evening. In the majority of cases of inflammation of the membranes of the brain, it is nearly equal, and without distinct remissions. The hurried respiration of this form of fever differs remarkably from that of pneumonia; in the fever, it is quicker at one time than another, hurried, it may be unequal, but it is not difficult; and on applying the ear to the chest, the respiratory murmur is heard clear and distinct. In the inflammation of the lungs, the frequency of the respiration is at all times the same, the breathing may be quick and hurried, but it is difficult, and the physical condition of the respiratory organs prevents the free admission of air. The cough, although more frequent, ceases to terminate in vomiting, and the expectoration at the termination of the paroxysms is very scanty.

Dr. Roe considers infantile remittent as an accidental circumstance, arising from neglect of the child's bowels, or diet, either previously to the attack, or during its continuance. In this opinion Dr. Watson coincides, and remarks that the complication is more accidental, and less a *consequence* of the hooping-cough, than a disordered condition of the bowels; but it may materially add to its peril.*

Dr. Roe gives the case of a little girl, aged five years, as the only instance of this complication

* Lectures on Practice of Physic, vol. ii., p. 65.

which he ever met with ; but he does not consider it one of genuine remittent fever.*

Remittent fever may occur in the third stage, as well as the second ; and should it continue for a period of time, without apparent relief, the child gradually becomes weak and emaciated, a degree of delirium comes on, the continuance of the cough increases the debility, and death may occur from exhaustion, as in low fever. It is very liable to terminate in hydrocephalus, and ultimately prove fatal, or it may produce disease of the mesenteric glands.

6. *Pertussis, complicated with Diarrhœa and Intestinal Disorder.*—Barrier notices these complications, as also does Dr. Copland, Dr. West, and other writers. *Diarrhœa* is not only a troublesome, but a frequent complication in the different stages of hooping-cough, and in its continuance greatly reduces the strength of the child.

“ It sometimes sets in with preliminary catarrh, and abates as that subsides ; but, in other cases, it harasses the patient at intervals during the whole course of the affection. It is, however, when it supervenes in the course of an attack of hooping-cough which has already attained considerable severity, that it should excite our chief solicitude. It does not, indeed, in the majority of instances, betoken the supervention of disease in the intes-

* On Hooping-cough, pp. 137 and 188.

tines, but is one of the forms of constitutional disturbance that attends upon a congested state of the brain, or it indicates the advance of serious mischief in the lungs.”*

The presence of diarrhœa conceals or masks many other important symptoms, so that they may be overlooked; it is therefore a complication that should not be disregarded, nor prevent our being prepared for a second, such as inflammation of the lungs, or bronchitis, a condition in which life is in great danger, and death likely to happen. Dr. West mentions a case of severe hooping-cough, in which diarrhœa was the most prominent symptom, and the bowels for days so irritable, that their action was excited by the slightest article of food or drink, while the abdomen was exquisitely tender; and yet when death at length took place, unusual redness and prominence of the glands of Peyer were the only morbid appearances in the intestines, while the signs of intense bronchitis and inflammation were discovered in the lungs, which in some parts had advanced to suppuration.

Diarrhœa, when prolonged, may become attended with more or less fever of a continued type, and a dry hot skin, with some slight pain, and then take on the characters of dysentery, the discharges becoming slightly sanguinolent and mixed with mucus. Should inflammation of the bowels set in,

* West, On Diseases of Infancy and Childhood. Lect. 23.

which does happen sometimes, it may extend to the peritoneum and mesentery, as has been observed by some authors, and prove fatal. The hoop in these cases is either totally absent or very mild, but the distress of the child is very great indeed; there is very little expectoration, and the vomiting, which is absent in some of the previous complications, becomes particularly distressing and frequent when any of the abdominal viscera are inflamed. Rare cases are mentioned, in which the liver, the spleen, and even the kidneys have participated in the diseased action going on, most probably by extension, from contiguous structures.

Another complication, and of some importance, is an *irritable state of the stomach*, with occasional *vomiting*, symptoms which are almost constantly observed at some period or other in the course of hooping-cough.

“In cases of a mild character, they usually occur only when the cough has reached its acme, and vomiting succeeds to none but the severest fits of coughing, while it is one of the earliest symptoms to cease as the severity of the disease declines. Sometimes, however, very distressing nausea harasses the patient, and efforts to vomit not only follow the paroxysms of coughing, but are excited by food or by the blandest fluid.”*

This symptom is one of serious importance in

* West, On Diseases of Infancy and Childhood. Lect. 23.

many instances, and often is an early indication of disease in the brain, as has been shown in the sixth chapter. It may, however, be a solitary symptom of nervous disturbance, without the child's health being seriously impaired, nor the cough very severe. In two instances that Dr. West met with, it appeared to be the result of a state of extreme irritability about the fauces, so that the cough, which hardly ever occurred at other times, was immediately excited by any attempt at deglutition, and the effort to cough terminated almost directly in vomiting.

Other examples of intestinal disorder, are nausea and vomiting, sometimes associated with diarrhœa; there is equal evidence of disorder of digestive organs, in a constipated state of the bowels, a red tongue, with, perhaps, numerous small aphthous ulcers about the mouth, or in the large quantity of frothy mucus rejected by the stomach at each effort to vomit.*

Pertussis complicated with Softening and Inflammation of the Stomach.—This must evidently be a complication of an extremely rare nature, but as it is mentioned as occurring in whooping-cough, by Wunderlich,† it shall be noticed. I shall premise by saying that, in pertussis, inflammation of the stomach may be present, which will

* West, On Diseases of Infancy and Childhood.

† Pathology and Therapeutics. Stuttgart.

be manifested by scarcely a single symptom during life, unless the simple act of vomiting, which, in itself alone, cannot be taken as testimony of its presence. In this view I am supported by the observations of Barrier, who goes a step further, and declares, that during a certain period of the disease, there is general gastritis, which cannot be observed either during life or by examination after death.* What becomes of the inflammation? It must have either terminated in healthy resolution, in which case no trace of it will be found after death; or else in softening. Can the state or condition of softening of the stomach be diagnosed during the life of the child? We are informed that it can.

As this complication, therefore, is one of grave importance, we ought to be prepared to meet it, should it arise in the course of the disease. The following symptoms are enumerated by Billard as characterizing "gelatinous softening." "An attack of violent gastritis in the commencement, such as tension and pain in the epigastric region; vomiting of not only the milk and drinks, but yellow and green fluids, occurring either immediately or long after eating or drinking. Sometimes there is a diarrhoea, varying in different subjects. It will return after having ceased for one or two days. The stools are often green, like the matters dis-

* *Mal. de l'Enfance*, tome i. p. 147.

charged by vomiting. Skin is cold at the extremities ; the pulse, generally irregular, is, however, very inconstant ; the face continually expresses pain, and is wrinkled, as if the child was crying ; the cry is painful, and the respiration jerking, and the general restlessness induces a belief of the existence of a cerebral affection. To these symptoms succeeds a general state of prostration and insensibility, occasionally disturbed by a return of the pain, producing, from time to time, the same restlessness which appeared at the commencement of the disease ; and, lastly, at the end of six, eight, or fifteen days, and sometimes later, the patient sinks, wasted by wakefulness, continual vomiting, and pain. In very young infants, scarcely any fever is manifested in the midst of this disorder. When the disease is chronic, the progress of the symptoms is slower.”*

In whooping-cough, it is extremely improbable that all these symptoms should be so well marked ; the cough, with its consequent vomiting, will disguise many of them. But a good deal of importance may be attributed to the general appearance of the child, its manner of lying, and the peculiar painful cry, together with the jerking respiration.

When the disease is established, death is frequently sudden in its occurrence, from rupture of the stomach, during one of the fits of coughing.

* *Mal. des Enfants*, Stewart's Trans., p. 267.

8. *Pertussis complicated with General Dropsy.*

—The violent paroxysms of coughing, which are so peculiar to the present affection, produce an impediment and obstruction to the free circulation of the blood in the veins, which, from the frequency of repetition during the twenty-four hours, is not completely restored in the intervals. We can easily conceive, then, under the influence of these, that the fluid or watery portion of the blood, and sometimes the red particles, will pass through the walls of the capillaries, and produce various forms of hæmorrhages and dropsies. Of the latter, we have familiar examples in œdema of the limbs, of the face, of the lungs, or of the body generally. These effusions may be poured out also into the abdominal cavity, the chest, or the brain, and even more rarely into the pericardium.

All these disorders must be attributed to the obstacles to the circulation which necessarily accompany hooping-cough. General dropsy, therefore, must not be overlooked as one of the complications, and is classified as such by Wunderlich.

During certain epidemics, whichever disease may become the complication often presents itself in a large number of cases. This occurred in the fearful epidemic which reigned in Sweden in 1769, during which, as has been observed by Rosen, very many of the cases which succumbed, presented serous infiltrations.

CHAPTER VIII.

COMPLICATIONS OF HOOPING-COUGH, CONTINUED.

9. *Pertussis complicated with the Exanthemata, or the Eruptive Fevers.*—Many writers notice the occurrence of the eruptive fevers, both before and during an attack of hooping-cough, and some of them consider this affection as a consequence of the eruptive fever upon which it may so closely follow.

Dr. Watt remarks, in relation to these fevers, “When the patient is labouring under some other disease at the time, or when he is still weak from having lately recovered from one, chincough is apt to prove both severe and tedious. I have seen this often after the measles, scarlatina, and small-pox, and I have also seen bad cases when it supervened on a diarrhoea, cutaneous eruptions, &c.”*

Dr. Macintosh supports this view, when he says that many of the severe cases met with in practice, are those in which the disease succeeds to small-pox or measles.†

* Treatise on Chincough, p. 79.

† Practice of Physic, vol. i., p. 403.

The previous existence of certain maladies, such as these eruptive fevers, more particularly measles, in a weak constitution, followed by hooping-cough, as is so very often seen, favours, in a very great degree, the invasion of those complications which render the disease so much the more dangerous. Dr. Copland shows this to be the case, when he states, that in such cases, when pertussis follows in either an epidemic or sporadic form, but particularly the former, rapidly *upon* measles, or occasionally during convalescence from that complaint, bronchitis, pneumonia, pleurisy, tubercles, or other disease, often steals on, without being suspected, until it has made a formidable progress, or has passed beyond the reach of aid.*

Measles appears to be the most frequent complication, and often shows itself, without any sensible modification in its progress. It is in the first or catarrhal stage that it most generally appears, and assumes the well-known characters of the disease. It is in the same stage, also, that some of the other forms, as scarlatina, or varicella, may present themselves. M. Blache has observed pertussis arising after measles five times in twenty-four cases. And, notwithstanding the opinion to the contrary by some writers, that there is no connexion between these diseases, other than that of their accidental association, there seems to be a sort of affinity, and

* Dictionary of Medicine. Part V., p. 237.

many points of analogy, between these affections and hooping-cough.

This view is likewise entertained by many high authorities, and among others, by Dr. West, who says: "I am not, indeed, able at this moment to adduce a number of observations bearing on this point sufficient to establish the fact beyond doubt; but my belief is, that the concurrence of any one of these diseases during the epidemic prevalence of another, increases the liability of the child to become affected by that which is epidemic; and that an exacerbation of the fever of hooping-cough, and the appearance of more serious illness than the local symptoms account for, is very likely to be due to the approach either of measles or varicella."*

Measles, chicken-pox, scarlet fever, and small-pox, like other intercurrent affections, often produce a temporary abatement of the paroxysms of hooping cough, and sometimes cure the disease altogether. This interruption or abatement of the cough, Dr. Watt has observed more frequently by measles than by any of the others. He quotes the following case, in illustration of this, from Dr. Ferriar's Medical Histories and Reflections, which I think of sufficient interest to introduce here.

"Miss —, aged one year, had the hooping-cough, in a slight degree, for some weeks. When it seemed to be leaving her, she was seized with the

* Lectures on Diseases of Infancy and Childhood.

measles, and there was the appearance of a very large crop of the eruption. Her cough was not very troublesome, and no longer resembled the hooping-cough. On the third day, she was seized with an extreme degree of dyspnœa, and a short harassing cough, and the eruption almost entirely disappeared. The pulse became innumerable. Leeches were applied to the extremities, blisters were applied to different parts of the body, and every method was used to renew the eruption, but without success. The cough increased, but the dyspnœa began to relax ; and at length, to my great satisfaction, the type of the hooping-cough was renewed, and my patient was recovered by time and change of air."

I believe with Dr. West, that in the abatement of the paroxysms there is nothing constant ; for, as he very truly remarks, hooping-cough often appears not to be in the least modified in its character by the supervention of the other malady ; while, in some cases, the complication adds to the mischief in the chest, and increases the patient's suffering and danger.

Scarlatina appeared in the case of pertussis under Barrier's care, which became subsequently complicated with apoplexy. The details will be found in Chapter VI. The bronchitis was increased after it, and the hooping-cough was diminished. In a paper in the *Lancet*, by Dr. James Miller, on the

Kidney in its Relations to Scarlatina,* there is a case of much interest which followed upon scarlatina, presenting as its sequelæ anasarca, albuminuria, and pneumonia. These preceded the whooping-cough, and the child, a little girl aged two and a half years, died from the lung disease. At the autopsy, the upper lobes of the lungs, the left especially, were found the seat of tubercular disease, in addition to induration, the result of chronic pneumonia. The kidneys were not diseased.

In four cases out of eleven described by Dr. Webster, an eruption appeared during the progress of the disease. In one it resembled measles, and lasted seven days; in another it was vesicular, and in the two others the form was not determined, but in these three disappearing from the second to the fifth day.†

In the case of Margaret Beaton, aged three years, described by Dr. Watt, an eruption of small red papulæ made its appearance at different times about the breast and neck, but did not continue for any length of time.

In one of Blache's cases, Clemence Deshays, aged seven years, entered hospital with pertussis. When seen, small pustules, rather hard at the base, were observed on different parts of her body,—namely, on her shoulders, neck, legs, and stomach; some

* Vol. ii., 1849, page 114.

† Med. Chir. and Phil. Mag., vol. i., 1823.

were dried up and shrivelled, while others were replaced by a black dry crust. He calls this vario-loid, but I think it is varicella globata, and the pustules were in reality vesicles. This child died from tubercular pneumonia.*

Dr. Roe describes a case of much interest, of a little girl aged three years and a half, who was attacked with measles, and had scarcely recovered when whooping-cough manifested itself. Under treatment she was improving rapidly, and had ceased to hoop, when, five days after, she was attacked with small-pox, under which she sunk exhausted.†

Dr. Duncan insists upon the propriety of regarding whooping-cough as an exanthematous disease, and asserts that it exhibits all the more constant characters of that class of diseases. The same doctrine was previously held by Volz. This view is considered by some as of too hypothetical a nature to entertain.‡

If we acknowledge there are some points of analogy between whooping-cough and the exanthemata, yet in nothing, as Dr. West points out, is the difference between these affections more apparent than in the uncertain duration of the former, in the

* Archives Gen. de Méd., vol. iii., p. 235.

† On Hooping-cough, p. 31.

‡ Dublin Quar. Jour., Aug. 1847, and Ranking's Abstract, vol. vi.

exacerbations which take place during its course, either causelessly, or from very slight occasions, and in the actual relapses that sometimes occur after apparent cure.

As to the frequency of the present complications, it will depend altogether upon the relation they bear at the time as epidemic diseases. In an epidemic of hooping-cough, which prevailed in 1806, at Geneva, and which has been noticed by Lando, a very large number were complicated with intercurrent cutaneous affections, and, among others, measles was remarked to be the most frequent. Stoll, in speaking of the epidemics at Vienna, remarks that, occasionally, they were attended by a miliary, and, in some instances, by a scarlet eruption. In a few cases, urticaria and erysipelas occurred.

Erysipelas, urticaria, zona (herpes), and some other diseases, therefore, occasionally are present in hooping-cough; but they do not appear to be of that importance which some authors have attributed to them.

10. *Pertussis complicated with Tuberculosis.*—

The present complication, under circumstances favourable to the deposition of tubercular matter, undoubtedly may arise in the progress of a case of hooping-cough, or may form one of its terminations.

It has been seen, in considering the last complication, that when pertussis follows upon measles,

it may become complicated with affections of the lungs, and, among others, the deposition of tubercles, and this state may not be discovered until it has made some progress.

This will be much favoured if there be a scrofulous habit, or any hereditary predisposition to phthisis. The frequent occurrence of hæmoptysis, also, is an equally significant omen of its threatened invasion; or a narrow, badly-formed chest.

Independently of these causes, however, it may arise in the wake of bronchitis or pneumonia; or, again, from the debility arising from a protracted hooping-cough, where the vessels of the lungs have been unable to recover their healthy state, from the harassing nature of the cough inducing chronic disease, terminating in ulceration of the mucous membrane, or in tubercular deposit. Dr. Copland thinks this complication is frequent from six to seven months upwards, and especially during the second, third, and fourth years of age.

Dr. Watt gives the particulars of a case of much interest, in a little girl aged four and a half years, in whom the hooping-cough was so severe that "the expirations were the most violent and rapid" he had ever seen. This was attended with a violent cough, hectic, and profuse expectoration. The hooping ceased in the course of the disease, and the cough assumed that of pulmonary consumption.

She died on the 21st of February. On dissection, the lower part of the right lung extensively adhered to the pleura costalis. It was of a whitish colour, had lost its cellular structure, felt hard and gristly in some parts, and soft and pulpy in others. A large abscess ramified through this part of the lung in all directions, partly filled with purulent matter. The parietes of the abscess were of a dense cheesy consistence, varying from a quarter of an inch to an inch in thickness. Beyond this solid portion, the whole substance of the right lung was interspersed with tubercles, in size smaller than peas up to that of hazel-nuts, and some in a state of ulceration and suppuration. The whole surface of this lung was covered with a layer of inflammatory exudation, and here and there the pleura appeared to be destroyed. The left lung contained nearly as many tubercles as the right, varying in size, but few of them in a state of suppuration. Dr. Watt, in his observations on this case, conceives that there can be no manner of doubt that the lungs were sound when pertussis commenced. The figure and general appearance of the patient could not be more remote from a phthisical habit. There might be, however, he says, some predisposition to phthisis, as her mother died of that disease. "Be that as it may," he observes, "it shows how readily the chin-cough may rouse that predisposition into action in

those where it already exists, and how readily, perhaps, even the predisposition itself may be excited in others.”*

This diathesis may show itself, in the form of true *tubercular hydrocephalus*, as a complication in pertussis. It is not of frequent occurrence, but should not be overlooked in weakly children who have long suffered from this disease. Dr. West has met with two instances of it: in one, the cerebral disease was associated with such a large amount of mischief in the chest as would of itself have sufficed to destroy the child.

The second case was one of much importance, and presents so many instructive features in its progress, as showing the insidious manner in which this fatal disease may steal on, presenting little to excite serious apprehension, he observes, until long after the possibility of doing good has passed away, that I hope I may be excused in transcribing it entire.

“The patient, a boy five years old, of a phthisical family on his mother’s side, was attacked by hooping-cough, from which he suffered severely. The disease was attended with great dyspnœa, with general œdema, and great lividity of the surface. No auscultatory signs of serious mischief in the lungs existed at any time; but the oppression of breathing was so considerable, and the child seemed

* Treatise on Chincough, pp. 159, 170.

so completely overwhelmed by the disorder, that I feared he would not recover. After he had suffered from the cough for about five weeks, and three weeks before his death, matters seemed to take a more favourable turn; his cough diminished greatly, both in frequency and severity, and his strength returned under a tonic plan of treatment. He still, however, continued low-spirited and very much disposed to sleep, and this condition of depression progressively increased, until, about a week before his death, he sank into a state of complete stupor; but no convulsions occurred, either as precursors of the stupor, or during its continuance. He lay on his back, either sleeping, or in a state of stupor, from which, however, he could be partially roused, when his pupils, before contracted, would become suddenly dilated to the full, and he would stare wildly about for a few moments: the pupils would then oscillate for a short time between dilatation and contraction, but soon revert to their former contracted condition. The bowels were not constipated at any time, neither did vomiting occur, and the pulse continued frequent till within a day or two of his death. Strabismus came on a day or two before he died, and two days before his death deglutition became difficult, and he began to make slight automatic movements with his hands and arms. Paroxysms of cough continued to recur to

the very last: they were suffocative in character, but unattended by hoop. At the end of the eighth week from the commencement of his cough, the child, who was extremely emaciated, died quietly.

“After death, the membranes of the brain were found much congested; there was a large quantity of fluid in the ventricles; the central parts of the brain were diffuent, and its lower parts were likewise considerably softened. The membranes at the base of the brain presented an opalescent appearance, and were bestudded with numerous minute granules, while about the optic nerves they were greatly thickened, and infiltrated with the hyaline matter to which I have so often called your attention.

“There was much congestion of the bronchi and pulmonary substance. The lungs contained a good deal of tubercle, mostly in the state of grey granulations, and a small cavity occupied the lower part of the left upper lobe.”*

Pertussis may be confounded with tuberculosis of the lungs, and especially of the bronchial glands, particularly when accompanied with a spasmodic cough, strongly resembling that of pertussis, and when the physical signs do not clearly indicate the presence of tubercles. Valleix† gives the following as the distinctive signs between the two:—

* Lectures on Diseases of Infancy and Childhood.

† *Résumé Générale de Path. Interne.*

Pertussis.

A contagious and often an epidemic disease.

The fits of coughing prolonged, terminating with a whistling inspiration, tenacious expectoration, and vomiting.

No general symptoms, in complicated cases.

Voice natural.

Tuberculosis of the Bronchial Glands.

Neither contagious nor epidemic.

The fits of coughing very short, and not terminated with whistling inspiration, tenacious expectoration, or vomiting.

Symptoms of hectic fever.

Voice often altered.

CHAPTER IX.

COMPLICATIONS OF HOOPING-COUGH, CONTINUED.

11. *Pertussis complicated with Pregnancy.*—We find that when in infancy and childhood there has been an immunity or exemption from the diseases incident to those periods of life, there is afterwards a predisposition to their invasion during the prevalence of epidemics or from contagious influences. Under such circumstances, the pregnant female is especially liable.

Instances are frequent in which she is a sufferer, during that eventful period, from either scarlatina, measles, or small-pox, the last perhaps more rarely. I have, however, witnessed examples of each. She is not exempt from hooping-cough more than any other disease, but perhaps she is in some degree more especially liable to abort or miscarry from it, owing to the severity and long continuance of the spasms of coughing, and their depressing influence on the entire system.

Dr. Von Iffland, of Quebec, speaks of a case of this kind in the first volume of the Montreal Medical Gazette, 1844. He says—“But a few

days ago, 10th September, such had been the violence of the convulsive cough, that my attendance was called to a young woman (æt. 17) in the sixth month of pregnancy, sinking under great flooding—the waters had been evacuated three days before. I lost no time in effecting the delivery of a living child—it was her first.”

I find also that Dr. Butter gives the case of a woman, aged 30, the mother of several children, who was in a state of pregnancy when attacked with whooping-cough. She suffered so much at times from the paroxysms of cough, which were very severe, as to threaten suffocation. She complained of pain in the right side, which would sometimes shoot through to the other, and sometimes downward, so as to imitate labour pains. This affection was subdued, and the patient was afterwards delivered of a healthy child, and she made a good recovery.*

Dr. Simpson, of Edinburgh, has met with such cases in the course of his extensive experience, and he kindly informs me that he has never, to the best of his recollection, seen whooping-cough in the pregnant female produce abortion; but he observes that some years ago he attended a case where he had every reason to believe that the severity of the paroxysms of coughing *would* cause premature labour. The lady, however, went

* Treatise on Kinkcough, p. 61.

on to the full time. Several of her children had hooping-cough at the time ; it was her own second attack. The child she bore did not take the disease, and never has had it, though several years old, and exposed to it.

It appears there is a common prejudice in Scotland that a child born *while* its mother has hooping-cough does not subsequently catch it, the disease being supposed to be passed through during intra-uterine life. He mentions, also, that some months ago the same idea was expressed by several persons in relation to a case, and where the mother was affected with hooping-cough at and for some time before the birth of her child. It was a question with some of the relations as to whether the mother and child should be *parted* ; it was declared by others to be quite unnecessary, in consequence of the above alleged law.

This is a question of much interest, and I am inclined to think that general testimony will be found to support the truth of it. No matter how young an infant may be, it is liable to have the disease if placed in circumstances favourable to it ; the case of Dr. Watson's bed-maker's daughter, referred to in the fourth chapter, may be mentioned as an example—the mother *not* being affected with the disease, but some of her other children having it—the moment the child was born

it hooped. The case tends to prove the truth of the question.

12. *Pertussis complicated with Hysteria*.—This singular and very rare complication has been noticed by some French writers, who have described it under the name of Pertussal Hysteria. I have witnessed one case of it in the General Hospital at Montreal, of which the following is an outline :—

Mary L——, aged 20, a native of Ireland, was admitted February 11th, 1845. Is unmarried, of short stature, her body fat and plump, apparently well in every respect, exhibiting no indication of any disease whatever. She has suffered from a very severe cough for thirteen weeks previous to admission, coming on at a regular period towards the evening of each day, which has remained unchanged up to the time of her admission. The catamenia appeared for the first time two years ago, on her first arrival in Canada, and has at all times been perfectly regular, without any intermission. Has never been sick in her life before. Does not know whether she has had any of the diseases of childhood.

After being in hospital for some months, it was found that, after enjoying tranquillity during the day, on retiring to her bed, generally between eight and nine o'clock, and *lying down*, the cough commences, of a very violent and distressing

character, and when once heard never to be forgotten ; it is continuous without intermission, and at every prolonged inspiration produces a loud and ringing hoop, as in pertussis. Its duration is from twenty minutes to an hour, and at its termination there is a well-marked hysterical fit, with fainting, crying, screaming, &c. This ends after a while, and she goes off to sleep much exhausted. Previous to the invasion of the cough, she has symptoms of the globus and clavus, and complains of a "great smothering and weakness." This cough does not commence whilst she is sitting up, nor does it cease again if she does so after it has commenced. Should she be asleep in bed before her usual time, the cough is as certain to appear at its appointed hour. She suffers almost constantly from pain in the forehead and eyes, and occasionally in the back and sides. Her bowels keep regular. There is some tenderness over the upper dorsal vertebræ.

July 4th. Very recently, the hysterical fits have ceased after the cessation of coughing. A blister to the front of the neck at 2 p.m. on the 3rd caused her to cough at 5, as well as at her usual hour. The cough twice a day has happened on two or three previous occasions.

This state of things continued for many months, the cough sometimes being better and not so severe, at other times worse, particularly when

undergoing some new medicinal treatment. It also came on later at night, between 10 and 11. Its character never varied ; it constantly possessed the series of loud expirations and the well-known hoop, and at its termination appeared to be followed by a little expectoration. She was finally discharged uncured, to try change of air ; but the cough continued for upwards of two years, and disappeared as suddenly as it came.

The medicines which she had taken would have sufficed to supply a whole dispensary ; all were powerless, scarcely producing any effect whatever. She was treated for *tænia*, but no worm came forth. The plans and forms of treatment used would fill a book.

It was not suspected at the time, but I believe now, that in this rare case, hooping-cough attacked the patient for the *first* time in her life, and, owing to some peculiar diathesis, it assumed the form which has just been described. Its long duration will not invalidate the truth of this supposition, because in hysteria we may often expect unusual and singular phenomena, which time alone appears to cure.

The loud, harsh, dry cough of hysteria, more like a bark than a cough, and without any hoop, described by many writers, must not be confounded with the affection already described, although this barking cough of simple hysteria resembles some-

times the most suffocating forms of croup. Two good examples of it will be found in Tate's work on Hysteria. Dr. Watson speaks of it in his Lectures, and so does Dr. Marshall Hall in his work on Diseases of Females.*

13. *Pertussis complicated with other diseases.*
—Intermittent fever is now and then met with associated with pertussis. In Sweden, in 1769, many cases were affected with this fever, and during its existence the paroxysms of coughing would temporarily cease, to return again when the fever had terminated. This is mentioned by Rosen. In the epidemic of Milan, in 1815, described by Ozanam, hooping-cough was in many cases accompanied by a double tertian fever; during the strongest accessions of the fever, the cough and paroxysms absolutely ceased, to return again with unusual violence at the decline of the febrile attack. At Billingen, in 1811, hooping-cough followed upon attacks of periodical ophthalmia; these were often associated with convulsive movements, with delirium, and with remittent and irregular fever.† Asthma, although very rare in children, has been known to prove a complication.

As illustrative of the importance of drawing attention to the complications just concluded, the

* Commentaries on Diseases of Females, p. 114.

† Barrier, Mal. de l'Enfance, vol. i., p. 148.

following table, taken from Wunderlich, shows the different ways in which the disease may prove fatal :—

Death in cases of pertussis may take place,

A.—During the paroxysm of the cough ;

1. By suffocation ;

2. In very rare cases by extravasation of blood into the brain.

B.—By complications ; namely,

1. By convulsions ;

2. By broncho-pneumonia ;

3. By meningitis and acute hydrocephalus ;

4. By softening of the stomach ;

5. By general dropsy.

C.—By secondary diseases ;

1. By tuberculosis ;

2. By pulmonary emphysema and dilatation of the bronchial tubes ;

3. By marasmus.*

* Quoted in Brit. and For. Med. Chir. Rev., vol. ix.

CHAPTER X.

TERMINATIONS OF HOOPING-COUGH.

PERTUSSIS, either in its simple or in a complicated form, may terminate in certain affections which will sooner or later produce a fatal result. Some of these may occasionally exist as complications, and may be the immediate cause of the fatal termination. But more commonly they are to be met with as secondary effects, and as unhappy evidence of the trying influence of a protracted hooping-cough in a necessarily weakened and debilitated constitution. They clearly point out, also, that our work is not over when we have cured the pertussal disease, but that something more has to be encountered, which may baffle our art, and render nugatory the most skilful treatment which may be employed.

These terminations are :—

Dilatation of the bronchial tubes.

Emphysema of the lungs.

Emphysema of the neck.

Œdema of the lungs.

Pulmonary phthisis.

Hydrothorax.

Pneumothorax.

Marasmus.

Tabes mesenterica.

Diseases of the bones.

Hernia and prolapsus of the rectum.

Epilepsy.

Ophthalmia.

Affections of the ear.

Asthma.

It is not my intention to consider all of these, but I shall make some observations on the more important. As consequences of pertussis, also, and becoming in a measure diseases foreign in their nature to the present work, I shall not say anything about them when I come to consider the treatment.

Dilatation of the bronchial tubes.—The existence of this pathological condition is altogether denied by some physicians as a result of hooping-cough, and others go so far as to say that it never does occur in young persons. To set this matter right, therefore, I shall quote a few authorities to prove the reverse of this, and that its presence is more common than is generally supposed. I have seen it as the result of chronic chest disease in old people, in some of the hospitals of Paris, the diagnosis during life being verified by examination

after death ; I have never seen it in children, but am quite prepared to meet with it in them as a termination of hooping-cough. The argument brought forward by those who do not believe in its existence is due entirely, I am quite satisfied, to their not having seen it.

Laennec says it is a lesion which, though not very common, is much less rare than he was for a long time disposed to think. It is not unfrequently met with in children after hooping-cough, and in elderly persons.*

I have seen it, says Billard, on one occasion in a child aged fifteen months, who died from pertussis, and it presented at the extremity of the larger bronchi a species of vesicle filled with a creamy and inodorous pus ; unequal dilatation and fissures of the bronchi have likewise been met with among certain children, as also has emphysema.† M. Blache considers this dilatation is due to the violent efforts of the patient to free the lungs during the spasms.

Dr. Copland says, "Dilatation of the bronchi is sometimes observed ; but I have not met with it so often as Laennec believes it to occur. It is to be looked upon as a remote consequence of pertussis in prolonged cases."‡

* On Diseases of the Chest, by Herbert, p. 99.

† Diet. des Dict. de Méd.

‡ Diet. of Med. Part V., p. 240.

Dr. Williams writes, "They have been observed especially to succeed to hooping-cough and other bronchial affections in which the cough is particularly violent and long-continued."*

Dr. Golding Bird has found that the bronchial tubes were, not uncommonly, dilated, even in children, and particularly in those who had suffered from protracted hooping-cough. He had found this dilatation at all ages, from the period of dentition to puberty. In this opinion Dr. Willshire agrees with Dr. Bird.†

Barrier relates the following most convincing case:—"During my residence in La Pitié, in 1839, a little girl was brought for advice to M. Clement, reduced almost to marasmus by a long-standing pertussis, and who presented under both clavicles well-marked *gargouillement*. Every person present believed in the existence of tubercular cavities; but having expressed my doubts to my superior, he agreed with me in opinion. In fine, the child was submitted to a treatment of a strengthening nature, which restored her by degrees, and a month later the dilatation of the bronchi, which had not, doubtless, completely disappeared, furnished no other stethoscopic signs than a blowing respiration."‡

* Diseases of the Chest, p. 99.

† Lancet, vol. i., 1845, p. 137.

‡ Maladies de l'Enfance, tom. i., p. 145.

The case of Claude Charmillon, aged 7 years, at page 90, which terminated by apoplexy, presented dilatations of the smaller bronchial tubes, which were filled with frothy mucus.

Dr. Watson mentions in his lectures “when the disorder (pertussis) has been long drawn out, and has at last terminated fatally, dilatation of the bronchi, such as I have described in the last lecture, is often found upon dissection; or, still more commonly, I believe, what is called *emphysema* of the lungs.”*

Dr. Strohl, of Strasburg, attributes dilatation of the bronchial tubes to, among other causes, hooping-cough.†

Further testimony is unnecessary, the fact of its presence in pertussis is too well established by a large number of respectable writers to require any comment. I shall content myself, therefore, with relating the following case from Laennec, necessarily abridged, and which has been already quoted by many writers of authority:—

“H. A. Lajoie, a boy aged three and a-half years, was admitted into the Hôpital des Enfants on January 30th, 1808. He had hooping-cough for three months; the paroxysms of cough were followed by copious expectoration of very offensive purulent matter, at times mixed with mucus; it

* Practice of Physic, vol. ii. p. 65.

† Gaz. Méd. de Paris, Sept., 1849.

had the smell of pus from an abscess by congestion; it was not expectorated in the usual manner, but continued to run by mouthfuls from the mouth for several seconds. On Feb. 3rd, it was remarked that he was always lying on the left side, which on percussion emitted a dull sound; he was blistered over it without relief, and on the 14th had an issue in the arm. From that day the child declined very rapidly, the expectoration commenced diminishing, and on the 15th it ceased altogether, when he died.

Dissection.—No effusion into the serous cavities; the lungs collapsed very little; the left adhered slightly to the costal pleura in its inferior half; its upper lobe was of a clear yellow colour, unattached, light, and crepitating, but the inferior lobe was heavy, hard, of a purplish colour, and livid on its exterior; on a deep incision, an ounce and a half of a purulent and fetid liquid escaped, similar to that expectorated. This liquid was contained in a number of round, smooth cavities, close to, and communicating frequently with, each other; the largest would contain the tip of the finger; there were a great number of others, which might hold a large pea. Upon minute examination, all these cavities were found to be prolonged into canals which terminated, by a longer or shorter course, and in different directions, in the bronchiæ, of which they were evidently the continuation. I

opened eight or ten of these ramifications, with a bistoury and director, in their whole length, and I saw distinctly that each branch of the bronchiæ, after a course of about half an inch, dilated considerably, increasing in diameter as it separated from the trunk, and terminating at last in a large cul de sac, at the distance of a line or two from the surface of the lung; near their extremities, the greater part of them would admit the little finger; others would receive a common-sized quill. In their course, they gave off some branches which terminated also in culs de sacs, after a course of two or more inches; all of them contained more or less of the purulent liquid already described. These canals formed at least three-fourths of the volume of that portion of the lung; an incision could not be made into it without dividing a great number of them. Here and there were seen ten or twelve red lymphatic glands, in size from a pea to a bean; they were all applied upon the bronchial ramifications, and penetrated with them into the middle of the lung. The right lung presented nothing similar; its inferior lobe was heavy, red, livid, sunk in water, and had no cellular appearance, except a little at its surface; it was much gorged with blood.”*

A more perfect and masterly description than this is nowhere to be met with, and for the more

* Treatise on Diseases of the Chest, by Herbert, p. 100.

minute details of the case, I must refer to the work of Laennec; but it quite sufficiently proves the genuine existence of this lesion as a consequence of pertussis.

In the dissections of two of Dr. Alderson's cases, the bronchial tubes were found much dilated, and he says, in all of them (four) the divisions of the tubes were somewhat dilated. This dilatation of the bronchial tubes, he remarks, is an organic lesion frequently overlooked, and can be detected only by tracing the individual tubes to their ultimate ramifications.*

In two cases of pertussis described by M. Blache, the ramifications of the bronchial tubes were found dilated, together with other lesions. An ordinary director was easily introduced to their extremities. A female sound entered readily two of these last ramifications, which terminated in a large cavity that was found at the base of the middle lobe of the right lung, in one case; this cavity was capable of receiving a large egg, and contained about two spoonfuls of a greyish liquid.†

The latest writer, Dr. West, remarks that this dilatation of the bronchi, which sometimes is very remarkable, arises from inflammation of the air-tubes, just as it does in ordinary bronchitis, and is

* Medico-Chir. Trans., vol xvi.

† Arch. Gén. de Méd., vol. xxxiii., pp. 235 and 239.

not due, as has been erroneously supposed, to the violence of the child's inspiratory efforts.

Emphysema of the Lungs.—This condition is sometimes associated with the lesion last described, more commonly it is present separately from it, and most generally in connexion with the remains of bronchitis. I believe it is very much more common than dilatation of the bronchial tubes in pertussis, although its existence is denied by some. Dr. Chowne does not believe its production possible in hooping-cough, and Dr. Golding Bird observes, that emphysema does not occur as the consequence of hooping-cough.* In the reverse of this, again, Professor Hasse declares, "of all forms, hooping-cough appears most liable to engender emphysema of the lungs, and is capable, in a very short space of time, of effecting the highest degree of dilatation in the pulmonary cells."†

On carefully examining Dr. Watt's cases of pertussis, in which bronchitis, &c. were complications, I find that, out of the eight cases described by him, interlobular emphysema was present in six after death. There were found cells varying in size and shape, continuous and isolated, filled with air, and with fluid, scattered over the exterior of the lungs, producing flat vesicles, with irregularity of surface of lung. In one case, they occupied

* *Lancet*, vol. i., 1845, p. 137.

† *Pathological Anatomy*, Syd. Soc., pp. 267 and 304.

two-thirds or more of the whole surface of both lungs, pressure increased their size and number, forcing along the air and mucus under the investing pleura.* Blache and Dr. Watson have been already mentioned as describing its presence in pertussis, and many other writers notice it. Barrier says, the violence of the cough explains the presence of emphysema of the lungs, and also, sometimes, that of the cellular tissue generally.† In a case under Dr. Roe's care, following upon measles, and subsequently proving fatal from small-pox, with other lesions after death, were observed emphysematous vesicles in the margin of both lungs.‡ He remarks, that emphysema of the lungs is probably the most frequent organic change that this disease produces in tolerably healthy children; and the symptoms which it occasions are, he says, a chronic cough, and constant oppression of breathing: those in whom such a state is induced as the consequence of hooping-cough, are generally doomed to labour all their lives under an incurable asthma.

Of nineteen cases of interlobular emphysema, of which a record was kept by Dr. Gross, of Louisville, U.S., three occurred in association with hooping-cough.§

* Treatise on Chincough, 110 *et seq.*

† Mal. de l'Enfance, tom. i., p. 147.

‡ On Hooping-cough, pp. 3 and 31.

§ Elements of Path. Anatomy, p. 440.

Dr. Townsend says he has frequently found the lungs emphysematous in children dying from whooping-cough; and in one instance, where the whooping-cough had not lasted longer than three weeks, he saw several cells dilated to the size of garden peas, of a globular form, and with their parietes evidently hypertrophied.*

The vesicular form I have no doubt is often associated with dilatation of the bronchial tubes; at least, so far as the description of many of the dissections goes, it tends to favour this belief. And in the complications of bronchitis and pneumonia, owing to the violent expiratory efforts made by the child during the paroxysms, we cannot be surprised to meet occasionally this form of emphysema. In fact, the vesicular form is described by some as dilatation of the minute bronchi and air-cells.

Messrs. Barthez and Rilliet and Dr. West observe, that emphysema is found only in those cases in which the affection has been complicated with bronchitis or pneumonia.

Emphysema of the Neck.—This may be produced by rupture of the air-cells and interlobular cellular tissue, without any injury to the pleura, and the air escaping through the roots of the lung and mediastinum, passes into the cellular tissue of the neck, and perhaps other parts of the body. This form of emphysema has been noticed by some

* Cyc. Pract. Med., vol. ii., p. 25.

writers, as likewise occasionally produced by violent paroxysms of hooping-cough. Dr. Johnson, of Dublin, has known it occur in three cases of this disease; and Dr. Mackintosh, of Edinburgh, and the late Dr. Beattie, of Dublin, "mentioned to us similar cases that had fallen under their observation."* It is noticed by Dr. Copland. It has been observed to occur most frequently in women during parturition, and in children severely affected with hooping-cough. As a terminating complication, then, it must not be disregarded.

Very few cases appear to be recorded: one I have been enabled to meet with, is that described by Dr. Herapath, of Bristol, and as it possesses unusual interest, I shall transcribe it without abridgment. Dr. H. remarks, that emphysema of the lung is by no means an uncommon occurrence in hooping-cough, an assertion in which I must cordially agree; the peculiar form under consideration could not arise without it.

"Mary H——, aged 18 months, was placed under my care, August 1st, 1848. She was suffering from a spasmodic cough, with an occasional whoop of an indistinct kind; symptoms of bronchitis also existed at the time. She was ordered to have two leeches on the sternum, and small doses of tartarized antimony at short intervals.

"The bronchitis was controlled in the course of

* Dr. Townsend, Cyc. Pract. Med., vol. ii. p. 15.

four or five days, by persisting in this treatment ; the febrile symptoms diminished ; and the whoop became more fully formed. The antimony was continued, but at longer intervals, during the whole of the subsequent week, in consequence of which the cough became less teasing and troublesome, and by the 15th, the whoop had almost entirely disappeared, but the spasmodic cough remained at this time. All fever had vanished. The child had lost its appetite, and its strength was considerably diminished ; the pulse was small, weak, and rapid ; the respirations were short and frequent, and more dyspnœa existed than the symptoms warranted ; but little mucous râle remained ; the face was pale and exsanguine ; the lips almost white. I prescribed one grain of the citrate of iron and quinine three times a day.

“No improvement resulted ; the dyspnœa steadily and rapidly progressed ; the axillary muscles of respiration were brought into play, but the countenance did not become livid until after a fit of coughing ; the chest sounded well on percussion everywhere. I, at first, attributed this dyspnœa to excitement, until the friends assured me she was always so. The cough was almost nothing at this period, it was readily smothered by the child.

“On the 17th of August, after a more than usually violent fit of coughing, a swelling made its appearance in the neck just over the sternum ;

the depression between the origins of the sterno-mastoid muscles disappeared, and was converted, in shape and appearance, into an enormous goitre ; but the boundaries were more diffused and extensive than this disease usually assumes. I saw it some hours after its first origin. It then appeared very prominent and diffuse ; the inferior extremity stretched downwards over the first and second bones of the sternum, and terminated in an acute point ; from hence the two external margins took a curvilinear direction upwards and outwards to the middle of the clavicle on each side, so that the tumour had a triangular appendage to it inferiorly. This appendage was elevated about three-eighths of an inch above the surface of the surrounding skin. Above the sterno-clavicular articulation it was a rounded prominent tumour, extending even up to the larynx, and outwards to the margins of the sterno-cleido mastoids on each side ; it had a very transparent appearance ; ‘it looked watery,’ as the relations expressed it, but the crepitant feeling experienced on handling it at once declared it to be air in the cellular tissue—emphysema. Whence came this ? I was at a loss to conjecture. It struck me as probable that one of the muciparous follicles of the trachea had ulcerated through all the coats, and permitted an escape of air under the fascia. The dyspnœa rapidly increased, as also did the swelling ; it at length extended to the

ramus of the lower jaw ; the face became livid, and the extremities cold. The child gradually passed into asphyxia, and died quietly on the 19th of August, at ten, A.M.

“A carefully conducted post-mortem examination was made on the 21st. Decomposition had not commenced. The dissection of the neck clearly showed the air to be in the cellular tissue, beneath the deep cervical fascia, and around the trachea. The whole of the cellular tissue here was emphysematous ; it passed downwards, behind the sternum, into the anterior mediastinum, the cellular tissue in which was excessively distended by air. The lungs were also broken up by emphysematous dilatations. The upper lobe on the right side was most extensively disorganised by it ; many of the cells were as large as currants and grapes, and all of them larger than natural. Air was proved to pass from the root of the upper lobe of the right lung into the anterior mediastinum, behind the pleura ; therefore, one of the distended emphysematous lobules at the root of this lung must have given way, and allowed the air to escape into the cellular tissue in the manner described. The other organs of the thorax and abdomen presented no appearance worthy of remark ; they were all anæmic. No air existed in either of the pleuritic cavities.”*

* Lancet, vol. ii., 1849, p 31.

The condition of the air cells most particularly deserves notice, many being as large as currants and grapes, and all of them larger than natural ; there were evidently both the vesicular and interlobular forms of emphysema present in this case, and it proves one of some instruction from many facts connected with it. As might be expected, it proved fatal, and very probably all the other cases referred to at the commencement of this section, must have terminated in the same way. Dr. Hera-path most correctly observes, that from the urgent dyspnœa, and the irremediable nature of the injury, it is almost impossible to be otherwise than a very fatal accident. This form of emphysema may be a more common termination than is supposed, but has not been so frequently described ; very probably, from its being looked upon as an accident, and not the result of a disease. M. Bonino has shown how rare it is to meet the two forms of vesicular and interlobular emphysema together, and accounts for the presence of both in whooping-cough, to the suddenness with which the air cells give way, thus precluding condensation of the intervesicular tissue.*

I find the following case of recovery described by Mr. George S. Lilburn, of a child four years old, labouring under whooping-cough, whom he found, on being called in consultation, lying in a state of

* Gazette Médicale de Paris, No. 31, Aug., 1835.

coma consequent on convulsions. Emphysema existed above the left clavicle, which, in a few days, extended through the cellular texture of the whole body, and was so extensive over the abdomen and ribs as to raise the skin at least one inch in that situation. From the puffed appearance of the face, the child's friends could not recognise him.

The main treatment consisted in keeping the child as quiet as possible, giving a solution of tartar emetic, with tincture of foxglove, in frequently repeated doses, to reduce the circulation and respiration to the lowest possible ebb ; and having the bowels relieved daily by a gentle cathartic. The diet was confined to one pint and a half of asses' milk per diem. After about a fortnight, the crepitus began to subside, and continued to do so, gradually but slowly, until it entirely disappeared.*

This is a more remarkable case than that of Dr. Herapath, inasmuch as the emphysema extended above the left clavicle, and thence over the whole body, and added to the fearful complication of coma consequent on convulsions. With this fearful state of things, the child perfectly recovered.

Œdema of the Lungs most frequently supervenes with any form of dropsy which may be present in pertussis. It is rarely to be found alone, and is more common from the increased exhalation supervening on exanthematous diseases, more particu-

* Medical Gazette, 16th Sept., 1837, p. 913.

larly scarlet fever and measles, than in hooping-cough. It is mentioned by Dr. Copland, and others, as one of the most common complications. It is not unusually present when bronchitis or pneumonia are complications, and, as one of the terminations, may give great trouble, owing to the embarrassed state of the breathing. Should it increase, from the rapid disappearance of dropsical accumulations elsewhere, the event may prove directly fatal.

Struma.—Under this head may be placed pulmonary phthisis and its consequences, hydrothorax and pneumothorax; marasmus, and tabes mesenterica. It has been previously shown that *Phthisis* may come on during an attack of pertussis, and go through some of its stages with great rapidity, and terminate in *hydrothorax* or *pneumothorax*. These, therefore, may be looked upon, as Dr. Copland remarks, more as unfavourable terminations in the far advanced stages of pertussis, than complications of the disease arising out of neglect, or inappropriate treatment, or constitutional predisposition. Dr. Watt believes, in the two cases he speaks of, that the phthisical affection spread from the mucous membrane of the bronchi to the substance of the lungs. He considers they illustrate one of the most unfortunate terminations of the disease—unfortunate, because they are attended with so much suffering.

I have seen more than one instance of children becoming phthisical on the cessation of the hooping-cough,—which, in the course of time, carried them off,—attended by the usual phenomena of that disease; and when it may come on in the course of pertussis, its progress becomes more rapid, the softening of the tubercles is much hastened, and the result is a fatal termination.

Marasmus and *Tabes Mesenterica* are other conditions depending upon the debilitating and exhausting effects of this disease, more particularly if there has been much loss of blood from frequently recurring epistaxis, or from some other cause. This engenders great feebleness, emaciation, and loss of appetite; the child becomes hectic, and tumbles into either of these states, a most pitiable object, and a picture of great suffering from the concomitant enlargement of the mesenteric or absorbent glands, and finally dies from pure exhaustion.

Diseases of the Bones.—Of these, rickets, curvatures of the spine, and affections of the joints, may be met with in protracted cases, or in the stage of decline, particularly if there has been neglect of means to break the chain of disordered action. They are very frequently indeed the immediate consequences of hooping-cough, and may show themselves when the disease is just at its termination. Mr. Tamplin, surgeon to the Royal Orthopædic Hospital, informs me that many of

the deformities of the human body, of the feet in particular, arise from the effects of protracted hooping-cough as their principal cause, in common with measles, scarlet fever, and other diseases of a similar class. Dr. Copland remarks that affections of the spine are generally owing to weakness of the muscles and ligaments of the vertebral column, induced by this disease; or to scrofulous inflammation of some portion of the column itself.

Hernia and Prolapsus of the Rectum.—There appears to be a facility towards the formation of these in very young children affected with pertussis, but more so of the former, as the inguinal and umbilical herniæ. Or a hernia may reappear after having become cured, from the paroxysms of coughing. Watt, Barrier, and several others mention these surgical accidents. Dr. Watt says that where it has existed before the pertussis, it becomes much aggravated, owing to the flatus in the bowels and the stress of the kinks. He speaks of a very troublesome case of this kind, where the patient had laboured under umbilical hernia from her infancy. Dr. Lettson reports a case in a boy seven years old, with inguinal hernia, and who, during an attack of pertussis, had the misfortune to break his thigh. The cough was so violent that it displaced the fractured thigh, and caused death five days after the accident.*

* Medical Memoirs of the London Dispensary, p. 304.

Epilepsy.—This is said to be a termination of whooping-cough, but I think it must be a very rare one, and may occur, if it already exists in the family, as an hereditary disease, or may come on if there is a well-marked strumous diathesis. Dr. Watt mentions three cases, at the ages of five, three, and two years, which terminated fatally from epileptic convulsions; as, however, they may have been the ordinary convulsions of children, from congestion of the brain or other cause, and not truly epileptic, I shall not give any portion of them.*

In a paper on the Etiology of Muscular Retraction, by my friend Mr. Brodhurst,† he mentions the following very interesting case:—"Feb. 10, 1852. I divided the tendons of the tibial muscles and the tendo-Achillis, in a strong plethoric infant of fourteen months, affected with double congenital varus. I had scarcely commenced the operation before the child was seized with an epileptic attack. I then learned that, at seven months old, it had suffered with whooping-cough and the first attack of epilepsy, and that at intervals since this time, on crying or coughing, the epileptic fit recurred." He presumes that the epilepsy was first developed *in utero*, as the child's father was subject to the disease.

* Treatise on Whooping-cough, pp. 59, 142, and 157.

† Med. Times and Gazette, 4th Feb., 1854.

Ophthalmia.—Many affections of the eyes appear to be as common a consequence of pertussis as diseases of the bones prove to be. The catarrhal form, however, seems to be the most frequent, and occurs in children of a strumous diathesis, often as the symptoms of pertussis are at their termination, and is much protracted in its duration and treatment. Sometimes inflammation arises in consequence of the rupture of some of the vessels of the conjunctiva, during the severity of the paroxysms, producing chemosis; but most generally this latter condition quickly disappears.

Affections of the Ear.—The violent efforts at coughing will sometimes produce a rupture of the tympanum, and hæmorrhage from the ears, which is sometimes profuse. The nature of the injury can be seen by examining the ear, when a rent will be observed in the membrane near its margin. This, however, does unite and heal up perfectly, so as to render the membrane intact; in rare cases, from some untoward cause, it does not.

In answer to a question of mine at a meeting of the physiological section of the Medical Society of London, in February, Mr. Pilcher mentioned these facts, and stated that he had observed such accidents very frequently indeed, and related a case occurring a short time back, of a little girl, the daughter of a nobleman, ill with whooping-cough, who threw herself upon the floor during one of the

paroxysms, when hæmorrhage took place from the ears in consequence of a rupture of the tympanum, the injury being observable at the margin of this membrane, which afterwards was healed.

Should deafness become a termination from the rupture remaining permanent, it may prove a matter of much inconvenience to the child, from its incurable nature.

In Mr. Wilde's practical and instructive work on Diseases of the Ear,* at pages 220 and 326, he refers to bleeding from the ears during violent paroxysms of hooping-cough, and supposes the source of the hæmorrhage to be from the ruptured tympanal membrane.

In relation to the subject of deafness being produced by this disease, he remarks at page 489—“In what way hooping-cough produces deafness, whether by local injury to the ear, such as often occurs during a violent paroxysm of that disease, or from its effects on the nervous system, I am unable to determine. Every nurse is aware of the many anomalous consequences which follow pertussis, and popularly denominated the ‘dregs of the hooping-cough.’ This disease has been specified as a cause of acquired deaf-muteism in all the tables which I have examined.”

* Practical Observations on Aural Surgery and the Nature and Treatment of Diseases of the Ear. By W. R. Wilde. London. 1853.

In a statistical table of the causes of deaf-dumbness, compiled from the Irish census of 1851, by Mr. Wilde, and published at page 486 of his work, five cases—3 males and 2 females—are set down as caused by hooping-cough under four years of age. These five cases occurred in a total number of 503 cases from other causes.

Asthma.—This is only mentioned here, as an ultimate consequence of the disease where recovery has been effected, notwithstanding the presence of dilated bronchi and emphysema, superadded to some affection of the lungs. I am not singular in this opinion that such circumstances may produce asthma in later years. Dr. Alderson, Dr. Roe, and some other writers, speak of it. Dr. Watt, after giving the diagnosis between asthma and pertussis, observes:—"It must be granted, however, that chincough sometimes terminates in asthma, and that many of the remedies which relieve the one are beneficial in the other."

The following case, under the care of Dr. Morehead, in which a child was reported to have been subject to asthma, and occurring as a complication, may with propriety be given here:—"Henry Wallace, aged seven years, a feeble boy, reported to have been subject to occasional attacks of asthma, was admitted into the General Hospital at Bombay, ill with pertussis, on the 23d of May, 1840, and died on the 26th. *Inspection*.—*Chest*: Both

lungs were pale and emphysematous, and completely occupied the chest. The right one presented, here and there, in all the lobes, the commencement of tuberculous deposition, either in the form of occasional grey miliary tubercles, or grey tubercular infiltration. A small quantity of frothy mucus exuded from the cut ends of the bronchial tubes. The left lung was white and dry, with very little tubercular deposit; there was little vascularity of the bronchial lining, but at the bifurcation of the bronchi there was a calcareous concretion, the size of an almond. The left ventricle of the heart was somewhat hypertrophied. *Abdomen*: The liver filled the epigastrium and projected beyond the ribs. The mesenteric glands ranged from a horse-bean to an almond in size, and some of them were cretaceous.”*

* Trans. of Med. and Phys. Soc. of Bombay, No. 6, 1843.

CHAPTER XI.

PATHOLOGY OF HOOPING-COUGH.

IN dwelling upon the pathology of the disease, and to facilitate the simplifying of its solution, I shall first give the appearances noticeable in cases of death from the perfectly simple and uncomplicated form of the affection, and will subsequently, in rotation, present examples of those most generally observed, as consequences of the various intercurrent or simultaneously arising complications, giving many of the latter from authors who have specially brought them forward as evidences, in some cases, of what they believed to be the pathology of pertussis generally. This will be a novelty, if it may be so called, in the treatment of this question, which it is hoped will meet with approval.

Simple Pertussis.—If a case proves fatal from asphyxia, suffocation, exhaustion, or syncope from sudden arrest of the heart's action, cessation of breathing, or the gradual cessation of the powers of life, in fact, the vital principle, what must we expect to observe as the consequences and the necessary results after death of this disease, in a

similar manner to a case of measles, small-pox, or some other affection, which may succumb from the peculiar nature of the malady itself? Now, as death from these causes is more or less rare in the simple form of pertussis, we cannot appeal to such a mass of evidence as has been afforded when it has been produced from other and very different causes again, but the careful testimony of those who have investigated the subject furnishes the following :—

The general substance of the lungs healthy, with no absence of crepitation.

The bronchial tubes more or less completely filled with a greyish drab or fawn-coloured watery mucus, mixed with minute bubbles of air, and much confined to the smaller branches and minute ramifications.

The mucous membrane of the larger bronchi and smaller tubes, varying in colour from a well-marked drab to a shade of pink, the latter occasionally darker and varying towards a red, but not a redness of inflammation from the absence of inflammatory congestion.

Hypertrophy of the longitudinal and circular muscular fibres of the bronchi, extending into the smaller branches, and visible to the naked eye as far as they can be slit up; the longitudinal hypertrophy being more marked in the larger bronchi and the annular in the smaller.

One or more fibrinous clots or concretions in the right ventricle of the heart, but their presence not constant.

Congestion of the pia mater and minute blood-vessels surrounding the medulla oblongata and origin of the nerves arising from it. This congestion varying in degree, but rarely if ever absent, and most generally very slight.

These are the only appearances to be met with in death during simple pertussis. There is another condition, however, which may be mentioned as occurring and noticeable during life, before any complication has set in, and which has been also found after death. I refer to enlargement of the *glandulæ concatenatæ* near the trachea, which has been observed by Dr. Ley and others, and an unusual swelling of the bronchial glands, which is frequently mentioned in the descriptions of post-mortem examinations. Much importance shall not be attached to this state at present, until it is supported by further investigation; but I would draw attention to the fact. When observing these glands enlarged in four children brought to Dr. Ley's house, labouring under pertussis, it induced him to ask the question: "May it not be that an enlargement of these glands, from a specific animal poison, similar to that of the parotid glands in mumps, is, after all, the essence of hooping-cough?"

The following instructive and very important

case occurred in my own practice, and proved fatal from asphyxia ; it was free from any local complication during life, and possesses features of more than ordinary interest :—

Mary H——, a female child, aged sixteen months, had an attack of hooping-cough in the beginning of December, 1849. Nothing unusual presented itself in the way of complication, the paroxysms were severe and frequent, and often followed one another in succession. She continued ill for three months and a half, when she was attacked in the evening, on the 11th of March, 1850, with a series of these paroxysms, following rapidly one after another, when she became asphyxiated, and died from syncope.

Autopsy, ten hours after death.—The lungs were healthy in colour and structure, and possessed the usual crepitation ; they partially collapsed on opening the chest. The smaller bronchial tubes, and a few of the larger, were filled with a drab frothy mucus, which could be squeezed out of them on section ; there was no sanguineous congestion. On slitting up the bronchi to some extent, and washing them with clean water, a number of circular rings were seen, which increased in size towards the larger branches ; but in the largest bronchi they were not so remarkable as a number of longitudinal lines, which became smaller again as they approached the smaller divisions ; these

were the circular and longitudinal organic muscular fibres of the bronchi, in a state of hypertrophy. The circular were not at all visible above the bifurcation, and the longitudinal disappeared, and could not be distinguished an inch and a half above the same. The larynx and trachea presented nothing abnormal, the colour of the membrane was the natural shade of pale pink near the former. The heart contained a fibrinous clot of a pinkish colour, which nearly filled the right venticle, and extended by shreds into the auricle. The bronchial glands were not enlarged, and the pneumogastric nerves were quite white and natural. The brain and its membranes were healthy, without any vascularity. The pia mater, in comparison with the rest of the brain, appeared congested around the medulla oblongata and its nerves, as also did the minute vessels at the origin of the latter. All the viscera of the abdomen were healthy, the bladder was half filled with urine.

This case is as fair an example as could be desired to illustrate simple pertussis. There was no dangerous complication to produce death, and if we carefully examine it, the only appearance to account for its occurrence is the fibrinous deposit in the right venticle. But the formation of this has been induced again, by the spasmodic contraction of the muscular fibres of the bronchi, which, continuing without scarcely any intermission, with the

almost total absence of respiration, was favourable to its deposition, which, again, when once commencing to form, death is certain. There is in this affection an exaltation of respiration immediately after the paroxysms, which over-supplies the blood, so to speak, with oxygen; and thus produces the state of super-oxidation. During the paroxysms there is, unquestionably, a stagnation in the process of decarbonization, but if that state was more or less constant, as some suppose, we might have the heart becoming diseased, which is rarely, or I may say never, the case. The complication of inflammation in some form occasionally arising, may be, in a great measure, due to the predisposition to its occurrence from the excess of fibrine already existing in the blood. The appearances which the heart may present in all forms of the disease will be described further on; and the explanation of those appearances in the simple form, which have been just described, will be considered at the conclusion of the present chapter, after the complications have received their share of attention.

Complications of Bronchitis, Pneumonia, and Pleuritis.—As the fatal cases most commonly terminate from the disease in the lungs, or in the brain, nearly all the structural lesions of importance are found in one or other of these organs.

Of the Bronchi.—The most constant alterations in the mucous membrane of the bronchi and

minute ramifications, are slight vascularity or much injection, more or less redness, sometimes intensely red, the redness may be scarlet or purple. These may extend to the trachea, larynx, and epiglottis ; or even to the pharynx and œsophagus. The redness in the ventricles of the larynx was found very marked in one of Blache's cases.

The mucous membrane may be thickened, soft, and pulpy, feeling like velvet to the touch ; it may be ulcerated in the glottis, and in the larynx and trachea, as mentioned by Astruc, Macintosh, and Alcock ; and the latter has found the inflammation of the larynx so great as to close the glottis mechanically.

The lungs collapse imperfectly, or they may completely fill the chest, and even bulge out on opening it. When cut into, the bronchial tubes and air-cells are found to be more or less filled, sometimes completely so, with a quantity of ropy or viscid mucus, and either frothy or purulent, or sanguinolent, and which exudes from them on pressure. The trachea and larynx may be lined with adherent puriform mucus, or with flakes of coagulable lymph.

The bronchitis may be accompanied by a considerable swelling of the bronchial glands situated at the bifurcation of the trachea ; some may be as large as a nut, of a brown colour sometimes, or even red, and, occasionally, tubercular at their

centres. The lymphatic glands in the substance of the lungs, also, may become enlarged and inflamed, of a red colour, varying in size from a pea to a bean, and applied over the bronchial ramifications. The thymus gland is often found enlarged.

Dilatation of the bronchi is often met with. Sometimes it occurs at the extremity of the tubes, and is owing to a development or distension of the air-cells, which take the form of little sacs or pouches filled with pus or mucus, varying in size from a pea to a small marble, or even larger; sometimes it may exist in the minute branches only, which are often dilated, and their calibre increased in such a manner as to receive the body of a crow-quill, or even a goose-quill, near their extremities; they may also give off branches, which again terminate in little culs-de-sacs or pouches filled with fluid; these dilatations may occupy as much as three-fourths of a lobe, as occurred in one of Laennec's cases. Sometimes, again, but more rarely, it is the larger bronchi which become dilated, and occasionally in a very irregular manner; the lungs presenting, on sections, a number of fissures, compared by Guersent, to the stone from a mill-stone quarry.

The two forms of Emphysema, the vesicular and interlobular, are met with, the latter most commonly. All of Dr. Watts' cases had this complication; it may spread over the entire surface of a

lung, and present an appearance of bad confluent small-pox, as described by him. In one of his cases, where the lungs were of a purple colour, a mixture of air and mucus existed under the pleura. Dr. Macintosh, who made upwards of fifty dissections, remarks that the anterior surface of the lungs, in almost all cases, presented spots of a whitish appearance, as if coated with lymph ; but this was found, upon closer examination, to depend upon emphysema, air being effused beneath the pleura, from the rupture or enlargement of the air-cells. The rupture of the air-cells and interlobular cellular tissue, may permit of emphysema extending to the mediastinum, neck, and thence to the general surface of the body. For a further description of emphysematous conditions of the lung, I must refer to the Chapter on the Terminations of Pertussis.

The dilatation of the bronchi, unquestionably, must be preceded by inflammation of the air-tubes, and as it is more frequent in pertussis than in ordinary bronchitis, the natural inference would be that the violent and continued efforts at coughing must assist towards its formation, and I feel convinced that this is the case.

Granting that the efforts made during the paroxysms of coughing are expiratory, I am not prepared to admit that the lungs are completely emptied of air ; if that were the case, we should

have a vacuum 'in the chest, which cannot exist; and, therefore, a certain portion of air remains in the air-cells, notwithstanding the most powerful efforts of coughing. In what manner does the dilatation occur, and vesicular emphysema arise? A portion of some of the tubes may be blocked up by either viscid tenacious mucus, or else lymph or croupy exudation, the cells and tubes beyond this exudation are filled with air, which is, as it were, imprisoned, and cannot be expelled, owing to actual paralysis of the annular muscular fibres. The quantity of the air may be increased by a sudden inspiration (not, however, during the hooping) forcing itself through the mucus during the general expansion of the lungs, and therefore unable to return; to compensate for which we find the air-cells dilated into pouches or sacs, and this dilatation extending to the minuter bronchi, which, after death, are found not only filled with fluid of some kind, but even firmly plugged up. The dilatation of the air-cells may proceed to such an extent,—which extent, however, is not absolutely necessary to do so,—as to produce rupture in some, and effusion of air, and perhaps fluid, into the interlobular cellular tissue, a condition so constant where bronchitis has been a complication, as to prevent the lungs from collapsing, and even permitting their extension beyond the natural boundaries of the chest.

Granting, as I said before, that the efforts at

coughing in pertussis are expiratory, it is to these expiratory efforts that the dilatation of the tubes and emphysema are due, and not to any forcible inspiration. This is explained by the pressure of the surrounding portions of lung, which are expelling the air and mucus during the paroxysms upon and around those blocked-up tubes and cells with imprisoned air, if I may be allowed the expression, and producing a general and unequal expansion upon them; this pressure is exerted in a similar manner to that of the hand on a small India-rubber bladder filled with air.

These conditions, I admit, cannot be produced unless preceded by inflammation; and this is borne out by the examination of cases after death which have been free from complication during life, in which they have not been discovered. The error which has been committed by so many in accounting for their presence here, has been in attributing them to the forcible inspiration, an observation which is in accordance with the opinion of Dr. West and MM. Rilliet and Barthez; but they, in their turn, have supposed them due to the bronchitis or pneumonia alone. It must not be forgotten that dilated bronchi are common in pertussal children, with inflammatory chest affections, and extremely rare in adults and old people, a fact which is further confirmatory of the view I have taken of their formation.

Of the Lungs.—These organs rarely collapse in

consequence of their increased solidity, arising from the extension of the inflammation from the mucus membrane of the bronchi to their substance, or attacking both structures simultaneously. They may contain much air, which is pressed out with difficulty; the inflamed parts may be of a livid, purple, or even red colour externally, and when pressed by the finger, owing to an œdematous condition, they retain its mark; again, they may be so hard and knotty as scarcely to be affected by pressure. Dr. Watt says the lung has felt like a piece of spleen or liver, and Dr. Elliotson has compared it to the latter; Dr. Copland uses the term splenification; the inflamed lung is harder and heavier than in the natural state.

A form which is peculiar to this disease, and the most common, is that termed carnification, the condensation affecting one or more lobules in different parts of the lung, but chiefly in the lower and posterior portions of all the lobes. These lobules are defined by well-marked septa constituting their boundaries, are of a dull red colour, free from air, sink in water, and are not changed by ablution. The smaller bronchial tubes are much dilated and lined with fibrine, or thick puriform and rusty mucus. The inflammation of the trachea or larger bronchi is absent.

These appearances of lobular carnification were present in Dr. Alderson's four cases. He says

the individual lobules were more dense than in hepatized lungs, and the cellular membrane between them retaining its natural structure, conveyed to the touch the same sensation that is felt on handling the pancreas. He apprehends that the appearances detailed differ from those found in peripneumony, and remarks, "In hooping-cough the lung is always dense and *contracted*, as if the air had been expelled, and from the throwing out of adhesive matter the sides of the air-cells had been agglutinated together, while, in hepatization, the lung is less dense than in hooping-cough, and is rendered more *voluminous* than in its natural state. The dilatation of the tubes and air-cells takes place in forcible expiration, in consequence of the plugging up of the bronchial tubes by false membrane, or dense muco-purulent secretion: *a foundation for future asthma.*"*

I am happy to find that the view entertained by Dr. Alderson, as to the production of dilatation of the tubes and air-cells, agrees with my own in their origin from *forcible expiration*. I had not read this part of his valuable paper before my own observations were written. It is not unusual to find the circular muscular fibres hypertrophied in dilated bronchi, and Dr. Williams mentions as one consequence of their dilatation, a defective tone of

* Med. Chir. Transac., vol. xvi., p. 91.

the circular fibres, as well as a loss of elasticity in the longitudinal.

The peculiar state of the lung, so well described by Dr. Alderson, has only recently received the name of collapse, or *carnification*, on account of its close resemblance to a piece of muscular tissue. Four years later it was mentioned by Rufz and Gerrard ; and the explanation of its occurrence, as given by Dr. Alderson, Dr. West remarks, has been proved not far from the truth, as shown by the more recent researches of Bailly and Legendre.

Instead of the lobules alone, or a portion of lung being affected with inflammation and true hepatization, independent of carnification, we sometimes find an entire lobe inflamed in pertussis, but this is rare ; the three stages of congestion, hepatization, and purulent infiltration, may be observed at one and the same time, or the two latter may be mixed, a section giving exit to pus and blood from the surface. In one of Dr. Watts' cases a considerable margin of the lower edge of each lung was inflamed, of a bright red colour ; and the incised surface of the lung, which was not hepatized, however, in a case of Dr. Roe's, presented a vermilion red colour ; and Dr. Mackintosh has found large portions of the lungs gorged with blood. The nine cases examined by Blache were complicated with pneumonia.

Of the Pleura.—The pleura is sometimes in-

flamed, covering the affected portion of lung, or it may be simply vascular; Dr. Watt mentions the pleura costalis as being very vascular in one of his cases. The pleura may be covered with lymph and form adhesions, as noticed by Dr. Mackintosh in a couple of instances; in a few, also, he has noticed the pleura-costalis covered with lymph like an unctuous secretion. There may be effusions of serum with numerous flakes of lymph, or mixed with blood. Marcus has observed these effusions. Ozanam has met cases with inflammation of the lungs and pleura combined; Guersent has frequently observed the two together, followed by effusion; in one case complicated with pleuro-pneumonia, with sanguinolent effusion, he found gelatinous softening of the stomach and diaphragm, the fluids in the stomach and pleura were so much alike that they were confounded with one another. It may be remarked that pleurisy and œdema of the lungs are more or less rare.

The Nervous System implicated.—This will comprise congestion and inflammation of the brain and its membranes, hydrocephalus, convulsions, and affections of the medulla oblongata and its membranes.

The vessels of the cerebrum and cerebellum, particularly the veins, are often found distended and gorged with black blood, accompanied by extreme vascularity of the membranes. These

characters may be altogether absent, or much less marked than might have been expected in cases where death has taken place from convulsions, or has been preceded by a comatose condition. There may be inflammatory irritation of the membranes, as found by Dr. Webster ; opacity of the arachnoid, by Dr. Armstrong ; adhesion between the dura mater and cranium, as in one of Dr. Watts' cases ; and deposits of tubercular matter on the surface of the arachnoid, near the base of the brain or superiorly. The convolutions of the brain may be found obliterated, as noticed by Dr. Webster ; softening of the cerebral substance, particularly the centre of the hemispheres ; irregular venous marbling of the medullary matter in one of Dr. Alderson's cases ; the puncta vasculosa numerous and large on a section of the brain being made ; and the choroid plexuses of a deep purple colour from congestion. Occasionally, there may be effusion of serous fluid into the ventricles, in the meshes of the pia mater (Watson), beneath and between the dura mater and arachnoid. Purplish serum infiltrated in the subarachnoid tissue was found in one of Blache's cases. In one case, which was accompanied by violent and intractable convulsions, with considerable rigidity of the superior extremities, Dr. Mackintosh found the substance of the brain of a *rosy* tint ; on making sections, large drops of blood quickly exuded from numerous

points on the cut surfaces. On exposing the lateral ventricles, the left *corpus striatum* and *thalamus* were observed to be enlarged, particularly the former; insomuch that in measuring the depth of the brain on each side, it was discovered to be nearly half an inch deeper on the diseased side than the other; when cut into it was found rather harder than the corresponding parts on the opposite side. The child had previously enjoyed a good state of health, and even after death did not appear much emaciated.

Inflammatory appearances have been observed in the medulla oblongata, or in its membranes, by Dr. Copland, even when no other remarkable lesion was present within the cranium.

The pneumogastric nerves were observed in two instances by Breschet to be injected, producing a red tint on the exterior; the tissue itself he found yellow; he found nothing in other cases examined by him. Inflammation of these nerves has been observed twice by Autenrieth, and fifteen times by Herman Kilian. The most careful dissections of Marcus, Jadelot, Guersent, Baron, Billard, Blache, Copland, Barrier, G. A. Rees, and myself, have found these nerves unchanged. Professor Albers, of Bonn, out of forty-seven examinations, found that in forty-three the nerve was healthy; in one it was reddish on the left side, and in three on the right side; these four cases were scrofulous and lym-

phatic, and the redness was found on the side on which the body had inclined, and in no respect, it appears, differed from what is observed in the bodies of plethoric persons, and of patients who have died of typhus fever. Out of eighteen careful examinations, Dr. West once only observed any alteration in the appearance of the vagus; in this instance both nerves seemed to be of a decidedly redder colour than natural, although they were not otherwise altered. Holzhausen and Clarus found in the body of a boy who had died of pertussis the phrenic nerves loose in texture and somewhat swollen; the trunks of the vagi likewise looser, thicker, and broader than natural; the great sympathetic and splanchnics, especially the latter, of a firmer consistence than usual; and the celiac plexus firmer and somewhat elevated.

Apoplexy.—Brain.—Extreme congestion and vascularity of the substance of the brain, or sanguineous effusion with the formation of a clot may arise, as in the case described by Barrier at page 90. As many cases of sudden termination are not often examined, the latter may be a more common result than is generally imagined. *Lungs.*—Apoplexy of the lungs may arise in cases where death has happened from asphyxia, during the paroxysms; Dr. Mackintosh mentions two cases of this kind, in which the lungs were found to be gorged with blood; the whole lung, when put into water, show-

ing far less buoyancy than natural, and large portions, when cut off, were found to sink to the bottom of the vessel. It was proved, however, that this increase of gravity was not owing to alteration in the texture of the organ, which resumed the natural colour, appearance, and buoyancy, when deprived of the blood by washing.

Of the Heart.—This organ is very rarely, or in fact never, found diseased, as a complication or consequence of pertussis. Sometimes serum is present in the pericardium, and very frequently fibrinous concretions and clots of blood are found in the right side of the heart. Inflammation of the pericardium is very rare, but Dr. Copland has met with it.

The following are the cases in which some of these were observed, with the names of the authors attached :—

Lettsom	293.	Pericardium	distended with an aqueous fluid.
Ditto	. 304.	Ditto	very full of liquor, somewhat of the colour of bilious blood.
Watt	. 123.	Ditto	more serous fluid than usual.
Ditto	. 131.	Ditto	larger quantity than usual.
Ditto	. 167.	Ditto	ditto ditto.
Ditto	. 181.	Ditto	ditto ditto.
Alderson.	Case 1.	Right ventricle.	Coagulum free from red particles.
Ditto	„ 4.	Heart healthy;	a small flattened cyst was situated at the apex, five or six lines in diameter, which contained a limpid fluid.

M'Intosh.	. .	Right side of heart and large vessels near it, were distended with dark blood.
Blache	. .	1. Right cavities contained fibrous coagula of blood.
Ditto	. . .	2. Right cavities contained some white fibrinous clots.
Ditto	. . .	3. Aorta reddish internally; no clots.
Morhead	. .	The left ventricle was somewhat hypertrophied.
Author	. .	Fibrinous clot, of a pinkish colour, nearly filled the right ventricle, and extended by shreds into the auricle.

We have in this table five cases with concretions found in the right side of the heart, and I believe them to be very commonly present after death, but very probably unnoticed, from the mistaken notion of their unimportance.

Of the Blood.—As described by Dr. Watt in one of his cases, obtained by venesection; it was of a dark colour at first; after standing twenty-four hours it did not separate into crassamentum and serum; it was then a soft, tender, gelatinous mass, the greater part red, but interspersed with large distinct portions of a bluish semitransparent substance like starch. Dr. Sims has found the blood very sisy, containing a quantity of fibrine. These tend to confirm the view I entertain that the blood is overcharged with fibrine, as can be proved by bleeding in any simple case, when it will be found after a while to have a remarkably well-developed pinkish yellow crust, erroneously considered by some as essentially inflammatory.

The researches of MM. Andral and Gavarret, of Simon, Lehmann, and Becquerel and Rhodier, do not furnish any information in regard to the state of the blood in this disease. Further investigations are still necessary to the more thorough elucidation of this important question.

Abdominal complications.—These will include the appearances found in infantile remittent fever, diarrhoea, and intestinal disorder, inflammation and softening of the stomach, and dropsical effusions.

Inflammatory appearances have been noticed in the œsophagus by Dr. Copland and Ozanam, of Milan. The former has found also the mucous membrane of the pharynx and epiglottis, particularly the latter, more or less inflamed, and the subjacent cellular tissue, especially at the base of the epiglottis, infiltrated and œdematous.

The mucous membrane of the stomach and bowels presents various degrees of vascularity and patches of redness, extending to actual inflammation; Dr. Copland has met with inflammation of the cœcum and colon occasionally; ulcerations have been in some instances found also in the cœcum and colon; unusual redness and prominence of the glands of Peyer in the small intestine; mucous follicles isolated and strongly developed; stomach covered with brown patches externally, half an inch broad, as if laid on with a brush, red streaks inside, and lymphatic exudation in upper parts from recent

inflammation, in a case of Dr. Watts'. The stomach may present a state of softening of all the tissues, with sometimes attenuation, and a total absence of bloodvessels, and perforation may be found, which, perhaps, has been the immediate cause of death. I have mentioned before that Guersent found in one case gelatinous softening of the stomach and diaphragm.

This last condition—gelatinous softening—I believe, in common with many other writers, to be a consequence of a pre-existing gastritis in pertussis; and redness in other parts of the stomach may be found, which are not in a state of softening.

The peritoneum and mesentery have been found inflamed; the meso-colon redder and more vascular than natural, or dark coloured and approaching to gangrene, in two of Dr. Watts' cases; enlargement of the mesenteric glands, with redness and engorgement in protracted cases; the liver, spleen, and kidneys may participate in the inflammatory action as observed by Mackintosh and others.

Löbenstein Löbel met with a case in which a considerable portion of the diaphragm was covered with pustules. Effusions of serum sometimes are found in the peritoneum, with or without traces of inflammation.

Of the Urine.—When accompanied with inflammation in some form it is diminished in quantity, of a deep brown, or very high coloured;

it has a strong urinous odour, and is thick and muddy: these characters were present in three of Dr. Watts' cases. On one occasion I noticed the urine to be albuminous; it was only temporary, and disappeared in a few days.

Tuberculosis.—The mucous membrane of the trachea and bronchi may present the usual characters of inflammation, with chronic thickening and ulceration at different points from tubercles. Tubercles in all stages of development and softening may be scattered through the substance of the lungs, accompanied with ulcerated excavations and vomicæ. Adhesions between the pleuræ, the surfaces of the lungs covered with inflammatory exudation, effusion of serum, with or without air, constituting either hydrothorax, pneumothorax, or the two combined, hydro-pneumothorax, may be present. Œdema of the cellular tissue in the mediastinum has occurred; also enlarged fatty liver and spleen in one of Dr. Watts' cases; tubercles in the liver in one of Dr. Lettsom's cases; and enlargement and induration of the mesenteric glands. Combined with some of these, tubercular hydrocephalus may terminate the case, and the membranes at the base of the brain be the seat of tubercular deposits, with a good deal of thickening and infiltration about the optic nerves, as in a case described by Dr. West.

Of the Exanthemata.—There is nothing very

particular to be found in these as complications. In a case under Dr. Roe, of death from small-pox, inflammation of the bronchi and lungs was present, with tubercles in both lungs. The trachea was very pale, excepting at its upper part, where a few small-pox pustules were scattered over it.

Other Conditions.—Girtanner lays some stress upon his having found the parts of generation in a morbid condition upon these occasions ; in fact, we might almost believe from his observations that this state is the *cause* of pertussis.

We have now seen the various conditions which offer themselves in all the forms of this affection, and they present a very numerous and important series of pathological phenomena. We have here an explanation of the views of the seat of the disease of so many authors in the subsequent chapter ; one party attributing it to diseased lungs, another to diseased bronchi, a third to the throat, a fourth to the brain, a fifth to the brain and lungs combined, a sixth to the genital organs.

It becomes quite clear, however, that none of these are the seat of the disease, any more than they are the seat of scarlet fever or measles ; it is impossible that pertussis can depend upon such a varied amount of severe disease, and it is a matter of choice for any one to select a special organ as the seat of it.

If we were to examine a large number of cases at one time, it would be observed how many would be suffering from the simple form of the affection, and how many might have the addition of complications. The latter would be subdivisible again, into their different varieties, and all could not possess the same individual complication ; this, then, overthrows the argument as to its being confined to any one organ, or set of organs ; possibly in particular localities, during certain seasons, owing to atmospheric causes, a number of cases might be complicated with affections of a special organ, but this is not a general rule, and too much importance need not be attached to it.

The affection, therefore, resolves itself into a simple disease, with a complication (when present) superadded to it ; or, to use the expression of Dr. Churchill, “hooping-cough, *plus* the peculiar complication.”

Morbid anatomy, therefore, furnishes little or no clue as to the nature of the disease, and the large mass of evidence which it affords becomes of little practical value or utility, and must be rejected altogether. How, then, are we to explain the nature of the disease, since pathology furnishes nothing ?

We must investigate and examine minutely the cases free from local complication ; we must turn our attention to the blood, and observe the absence

rather than the presence of pathological phenomena after death. Death is rare, as has been shown, in the simple form of the affection, and it has been the reason, in a great measure, of the diversity of opinion which has prevailed. But when opportunities for dissections have been afforded, nothing remarkable has been noticed, and certainly no inflammatory appearances have been found; most of the recent authorities agree in this respect.

The appearances observed in the simple form which have been described in the first part of this chapter, may be taken as representing the pathology of pertussis, and will help to explain the phenomena of the disease; they are given as the only conditions to be met with in the simple form of the affection.

A few words may be necessary in relation to the state of hypertrophy of the bronchial muscular fibres. This may be explained by the spasmodic contraction of the circular fibres of the bronchi, which from morbid excitement commences and continues unceasingly, with scarcely any relaxation, until the offending mucous secretion is expelled in the acts of expectoration and vomiting combined. The longitudinal fibres are equally influenced in the retractation of the bronchi themselves during the expiratory efforts, and assume a similar condition. As the spasm is of an exceedingly active kind, the continued action produces an increase in volume,

in the same manner as an external muscle becomes developed from continual use.

One feature of great interest in the case in which these fibres presented this condition, is the termination of the hypertrophy at the bifurcation, which proves very satisfactorily that the contraction of the bronchi ceased at that spot during the severe expiratory efforts, leaving the trachea remaining more or less free, or in a state of contraction and retractation for about an inch only above it.

This hypertrophied condition cannot be regarded here as a truly pathological phenomenon, for it would as surely disappear again when the hooping-cough will have become cured.

The absence of respiration during the kinks, which Laennec supposed to be due to either a momentary congestion and thickening of the mucous membrane, producing obstruction in these canals, or to a *spasmodic affection of the bronchi*, is unquestionably owing to the latter cause, as pathology in reality distinctly proves, and which I feel satisfied will be confirmed by future observers.

There is a strong analogy between asthma and hooping-cough in this respect, for, although there may be an absence of the paroxysms in the former, there is an irritability of the bronchial tubes particularly remarkable, which manifests itself by their atonic contraction, thus producing a similar hypertrophied state of these fibres. This was singularly

verified in the case of a gentleman under my care, who had passed a large portion of his life in the Hudson's Bay Company's territories, and who was a sufferer from asthma; the longitudinal fibres were found, however, in him, in a greater state of hypertrophy than the circular. A still further analogy exists between the two diseases in the fact that, although there is an absence of the cough in asthma, the severe dyspnœa, occurring in paroxysms and probable congestion of the lungs, is relieved by a copious secretion of mucus, similarly to the profuse expectoration at the termination of the paroxysm in whooping-cough.

The concretions in the heart are due to the fibrinous state of the blood, and are especially liable to form, should any cause arise to impede the circulation through that organ, a tendency which is present during the paroxysms.

The congestion of the minute vessels around the medulla oblongata and nerves arising from it, and the condition of the bronchial mucous membrane and its secreting processes, are both produced by the same cause, whatever that may be,—most probably reflex nervous action,—manifesting itself at the two extremities of the pneumogastric nerves, and induced by the introduction of some unknown poisonous principle into the blood as inexplicable in its nature as that producing any other zymotic disease.

CHAPTER XII.

OPINIONS OF VARIOUS WRITERS AS TO THE NATURE,
PATHOLOGY, AND SEAT OF PERTUSSIS.

IT may be necessary, to render the present work as complete as its prescribed limits will permit, in giving the opinions of different writers as to the nature and seat of pertussis, to go as far back as the time of Willis, following, in this respect, the example of Dr. Watt. It is not at the same time intended, however, to combat all these, but some remarks will be made upon them as I proceed, wherever it may appear advisable and proper to do so. By thus giving the views, however brief, of almost every writer of authority to the present time, it will render the present chapter especially useful, as one of reference, as furnishing the means also of contrasting those views with one another, and at the same time affording at a glance a picture of the conflicting opinions entertained by so many upon the true *nature* of a disease which, after all that has been said, is not in reality of that great importance as essential to its therapeutical treatment, in so far as to what may be the specific essence of the disease. These will be concluded by a consideration of the patho-

logy of simple pertussis, given in the preceding chapter, and an epitome of my own views as to the nature and seat of the disease.

Willis considered it a quick, vehement irritation of the lungs, stimulating them to throw off the serum from other parts of the blood, thus producing a convulsive cough, exceedingly injurious to the function of respiration. This serum he looked upon as being distilled into the cavity of the trachea and bronchi.* Hoffmann attributed it to an acrid serum in the blood.

Sydenham imputed its presence to some irritating effluvia in the blood, thrown upon the lungs, in consequence of suppressed transpiration, and exciting the paroxysms. Harvey looked upon it as a disease of the stomach and alimentary canal.

Huxham thought it was owing to a morbid condition of the intestinal canal. Dr. Butter that it depended upon derangement of the bowels and liver from miasmatic influences.

Boehme conceived it to proceed from a peculiar miasm, acting chiefly on the nerves. Girtanner has advanced the notion also that the disease owes its origin to a specific miasm, analogous to that of marshes.† Waldschmidt, Stoll, Friborg, and Brouzet that it was caused by crude and bilious matters in the stomach.

* Operation of Medicines on Human Bodies, part ii. p. 40.

† *Über die Krankheiten der Kinder.* Berlin. 1794.

Danz and Lentin place the seat of disease in the lungs as well as the stomach ; they admit that the other symptomatic disorders accompanying it vary exceedingly, whilst the respiratory functions are more constantly disturbed.

Linnaeus* maintained that it arose from inhaling, in respiration, the minute eggs of a peculiar species of insect ; this view, somewhat modified, was advanced by Riverius, Desault, Rosen, and others. Rosen believed that it was propagated by contagion from affected individuals, the particles of the disease being absorbed by the respiratory organs and stomach, the consequent affection of those viscera producing a great secretion of phlegm.

Millar thinks it may be owing to the same peculiarities in children by which asthma is produced.† Astruc affirms that it principally consists of inflammation of the mucous membrane of the pharynx and larynx, particularly the former, which he says is sometimes ulcerated.‡ Strong, Cullen, Lettsom, and Darcey have found similar evidences of inflammation of the mucous membrane of the larynx and trachea ; Cullen, however, placed it among the neuroses, and considered it as a specific irritation of the nervous system. Jones

* Dissert. Exanth. viva in Amœnit. Acad., vol. v. p. 82.

† On Asthma and Hooping-cough, p. 138. 1769.

‡ Diseases Incident to Children, p. 142.

defines it to be a disease of debility in persons of a lax fibre.* Burton says it is caused by a laxity of the fibres, producing a quantity of thick phlegm obstructing the lungs.

Chambon† and Tourtelle‡ considered it a species of catarrh. Its seat was placed in the stomach, by the former, who, supposing it of an asthenic nature, imagined the cough and other nervous symptoms to depend on the affection of this organ. The latter extended the gastric disorder to the lungs, and regarded the disease as a pituitous pneumo-gastric affection. Styx held a similar opinion. Gardien refers it to a nervous irritation, *sui generis*, causing a pituitous or increased mucous secretion from the bronchi and stomach with convulsive action of the glottis and diaphragm, and believed that it differs from catarrh chiefly in its course and the periodicity of its character.§ This nearly agrees with the opinion of Tourtelle. The opinion of Millot also was not materially different from the foregoing, in referring the disease to a spasmodic irritation of the stomach primarily, and of the lungs symptomatically. Broussais is another who places the source of the disease in the stomach; he believes that it consists of inflammatory irrita-

* On the Tussis Convulsiva, by J. G. Jones, p. 12.

† Maladies des Enfants, tom. ii.

‡ Elémens de Méd. Théoretique et Pratique, tom. ii.

§ Traité des Mal. des Enfants, p. 391.

tion, producing an increased secretion of mucus, and that the termination of the fits in vomiting disembarresses the affected surfaces, and assuages the irritation for a time.*

Dr. Watt states that it is in all cases an inflammatory disease, and that its chief seat is in the mucous membrane of the larynx, trachea, bronchi, and air-cells; in other words, bronchitis. But the inflammation may be so mild as to cause no inconvenience, or so severe as to cause death. He asks the question as to whether there may not be some eruptive disease of the mucous membrane, so minute as to escape observation, but so considerable as to excite the inflammation, which is apparently the principal part of the disease.†

Dr. Badham, Darwin, and Marcus, of Bamberg,‡ agree with Dr. Watt. Messrs. Broussais (already quoted), Boisseau, Rostan, and Duges, regard it as a specific inflammation of the bronchi; Dr. Dawson limits the inflammation to the mucous membrane of the glottis and larynx. Dr. Dewees looks upon it as a catarrhal inflammation of the respiratory mucous membrane, with an augmented secretion of mucus.§

Albers, of Bremen, denies its being essentially

* Copland's Diet. of Medicine.

† Treatise on Chincough, pp. 191 and 151.

‡ *Traité de Coqueluche*, 1816. Trad. par M. Jacques.

§ Treatise on Management of Children, 1825.

inflammatory, and that it is never so rapidly developed as bronchitis. He considers it a disease of the nerves of the chest, frequently occurring spasmodically, and generally admitting of cure without the assistance of art, unless when appearing in a complicated form, or when inflammation supervenes during its progress. Fourcade-Prunet looks upon it as a variety of bronchitis. He attributes the convulsive paroxysms of cough to the morbid sensibility of the mucous membrane of the air-passages in their inflamed state, and to the irritation occasioned by the respired air and the secretion formed on this membrane.

The opinion of Dr. Mackintosh is, that the nervous system is seriously involved in this affection, but he cautiously receives the doctrine of spasm. The essence of the disease, he says, consists in irritation and inflammation of the mucous membrane of the body, but more particularly of the air-passages. This is proved, he observes, by the pectoral or catarrhal symptoms, which are to be observed from the very onset of the disease; by the increased secretion; and by the result of dissections.*

Hufeland supposed it to be a disease chiefly affecting the pneumo-gastric nerves. His explanation is, that the irritation of the nerves supplying the larynx and bronchi is extended to the diaphragm

* Pathology and Practice of Physic, vol. i. p. 408.

by the intimate sympathy existing between these parts, throwing this muscle into convulsive action; and owing to its action on the cardia, and the irritation extending to the stomach through the medium of the eighth pair of nerves, this organ undergoes energetic contraction, and evacuates its contents; the vomiting thus produced removing the irritation of the respiratory organs, and thereby terminating the paroxysm. Thus, the vomiting is the antagonist of the spasmodic state of the organs of respiration; and as observed in practice, a salutary occurrence.

Jahn considers it an affection of the phrenic nerves, occasioned by a peculiar miasm, too subtle to be recognised. Löbenstein-Löbel contends that the disease originates in a peculiar affection of the nerves of the diaphragm; that in its second stage the phrenic nerves are in a state of irritation; and in its third, the irritation is expanded throughout the system; thus commencing with a morbid affection of the diaphragm, which extends itself by nervous connexion to the rest of the respiratory apparatus and stomach, and sympathetically to the whole economy.* Dillon, Breschet, Eberle,† and Pinel regard it also as a nervous disease, perhaps of the brain, or pneumogastric nerves; Pinel gives it a place among the pulmonary neuroses.

M. Guibert views it as essentially nervous. He

* Copland's Med. Dict. † Diseases of Children, p. 479.

remarks that a common cough may pass into this affection, from spasm of the muscles of the larynx and diaphragm supervening upon it. The spasm arising from the nervous susceptibility and particular disposition to it arising in children, and from individual idiosyncrasy.* Paldamus supposes the lesion to be in the phrenic and pneumogastric nerves, but thinks that it depends upon exalted irritability of the lungs, and of the organs most closely sympathising with them, as the stomach and diaphragm.†

Dr. Webster looks upon it as essentially a cerebral disease, and the actual seat of it may be in the head. He considers the affection of the respiratory organs as only a secondary effect, or an effort of nature to relieve herself, by expanding the lungs to an unusual degree, in order to allow a greater quantity of blood to flow into them, and thus diminish the fulness and congestion of the brain. He observes that the pectoral symptoms are preceded or accompanied by pain of the head and fulness about the temple and eyes; and notices particularly the relief which epistaxis affords, and the fact that hydrocephalus sometimes occurs as a sequela to the complaint. He considers his view of the pathology also confirmed by the marked success of his plan of treatment, the application

* *Récherches sur la Croup et la Coqueluche*, 1824.

† *Der Stikhausten*. Halle. 1805.

of leeches to the forehead and behind the ears, in 111 cases of the disease.*

Alphonse Leroy expressed a similar opinion to that adopted by Dr. Webster, in 1803. He thinks it should be classed amongst the diseases of the membranes of the brain, by reason that its characteristics are essentially nervous; that it is epidemic; very often intermittent; and that it comes on at stated periods.† Boisseau, Otto, and Begin admit the frequency of the association of cerebral affection with whooping-cough, even from the commencement; whilst they oppose the inference that the latter is dependent upon the former. Dr. Webster is, however, as Dr. Copland remarks, the first writer who fully appreciated the influence of the cerebral irritation in the respiratory organs in this disease, and excited attention to an important and early complication of it.

Dr. Alcock states that he invariably found the larynx inflamed, and sometimes so much so as to close the glottis mechanically; that the mucous membrane of the trachea and bronchi were very vascular; and that the cavities of the latter were filled with fluid, mixed with air. From these facts he infers that the cough is a mere natural effort to expel the offending matter, when it has accumulated to such a degree as to impede respiration, and that

* London Med. and Phys. Journal, vol. xlvi.

† Méd. Maternelle, 1803. Paris.

its violence is in direct ratio with the tenacity of the phlegm.*

Dr. Alderson conceives himself justified in considering inflammation of the lungs, which he has found on dissection in all the cases he has examined, to be the effects of the continued and uncontrolled action of hooping-cough. He does not, however, explain the nature of the disease.†

Wendt places this among the neuroses ; he does not believe in a secretion peculiar to it, but thinks it is produced by a certain miasm, arising from the particular season and constitution of the atmosphere, and prevailing generally in an epidemic form. The branches of the intercostals, the eighth pair, and the recurrent nerve, he believes, are chiefly affected. The solar plexus he views as affected secondarily.‡

Dr. Gregory remarks, from the various facts which might be adduced, a reasonable presumption exists that it has its origin in a specific contagion or miasm, which, like that of the measles, has a direct determination to the membrane of the bronchi, though it is not, like the rubeolous germ, associated in all cases with fever.§

Dr. Fife looks upon the disease as a neurosis altogether distinct from bronchitis, and has taken

* Lectures on Surgery, p. 132.

† Medico-Chir. Trans., vol. xvi. p. 79.

‡ Die Kinderkrankh. System 1822.

§ Theory and Practice of Medicine, p. 474.

a good deal of pains to prove that the two diseases cannot co-exist. He institutes a series of comparisons between the two in support of his doctrine, in the form of six propositions.* These have been ably reviewed in a subsequent paper on pertussis, by Dr. Ogier Ward, with whom I agree in many particulars.† The question of the co-existence of the two diseases is so well established by the testimony of writers of no mean authority, and—what is still of more value—by experience, that it is unnecessary to go into the subject further than simply to refer to the fifth chapter of this book, in which bronchitis as a complication is especially considered.

M. Guersent, in common with many others already mentioned, pronounces it to be a catarrhal affection of the trachea and bronchi, consisting of a specific inflammation, and accompanied with spasm of the glottis.‡ Hasse says, experience would, indeed, rather lead to the conclusion of its being nothing more than chronic catarrh, which, in persons prone to strong nervous reaction—like children, and equally excitable adults, especially of the female sex—provokes the well-known paroxysms. He considers it not fatal in itself, but only through the complications that beset ordinary

* *Prov. Med. and Surg. Jour.*, 16th June, 1847.

† *Ibid.* 20th October, 1847.

‡ *Dict. de Médecine*, vol. vi., p. 15.

catarrh.* Dr. Wagstaff is inclined to the conclusion that it is nothing more than chronic catarrh, agreeing in this respect with Hasse, and, with this view of its pathology, treats it by topical applications to the pharyngo-laryngeal mucous membrane.†

Desruelles, again, looks upon it as bronchitis complicated with irritation of the brain, the former always preceding the latter, and from the union of the two, calls it *broncho-cephalitis*. As this view is partly approved of by the writer who succeeds, I shall quote the following:—"So long as the bronchitis is simple, the cough is without any peculiarity; but when the diaphragm, muscles of expiration, and of the glottis, larynx, and posterior membrane of the bronchi, and the air-cells of the lungs, come into action, and are simultaneously affected with spasm, under the influence of the cerebral irritation, the cough changes its character, and becomes convulsive, and every time that an afflux of blood takes place into the brain, the cough returns, and appears in paroxysms. This intermittent congestion precedes the kink of coughing, and disappears along with it, to reappear shortly, and to bring on a fresh paroxysm."‡ Upon this theory of Desruelles, Dr. C. Johnson remarks, that

* Path. Anat., Syd. Soc., p. 267.

† On Dis. Muc. Mem. of the Throat, p. 164.

‡ Traité de la Coqueluche, p. 77.

it has the great recommendation of being in accordance with the practice which has been found most beneficial in the treatment of the disease; and it has been justly remarked, he observes, that the effects of remedies, if accurately observed, are like chemical tests, frequently the means of detecting important differences in objects which, otherwise, could not have been distinguished from each other.* From these observations of Dr. Johnson, it will appear that he inclines to a similar view with Desruelles.

The work of the latter was translated into German, in 1828, by Dr. Gerhard von dem Busch, accompanied by most copious notes. Although he does not furnish any clear exposition of his own views in his notes, yet we are led to believe, from many of his remarks, as well as from the general tendency of his arguments, that he adopts the opinions of Hufeland and others of his countrymen, already cited—namely, that pertussis consists in an irritation of the mucous membrane of the bronchi, accompanied by a diseased condition of the eighth pair of nerves.† I believe Desruelles' work has been translated into English in the United States, where many other excellent foreign works appear in the same language, and, unfortunately, are not to be met with in this country.

* Cyclop. of Pract. Med., vol. ii. p. 429.

† Amer. Jour. Med. Sciences, vol. x., 1832, p. 220.

Messrs. Maunsell and Evanson very cautiously abstain from any positive opinion, but they freely confess their entire ignorance as to the intimate nature of the affection. They observe, "All we know is, that the symptoms in the first stage show the bronchial mucous membrane to be in a state of irritation, if not inflammation; and that in the second, they assume a distinctly spasmodic character."*

Dr. Eben Watson, of Glasgow, adopts the theory that the poison of the disease first causes inflammation of the respiratory surfaces, and very speedily affects the nerves, so as to render the glottis peculiarly irritable. He believes that, in a case of uncomplicated pertussis, the morbid poison first influences the mucous membrane lining the pharynx and upper part of the larynx, affecting there the extreme branches of the sensory nerve, the superior laryngeal, in some peculiar way; and that, finally, the motor nerve, the recurrent laryngeal, is excited into reflex action. Hence, he says, the ordinary progress of the symptoms, which first resemble those of a common cold, or slight bronchitis. Along with this symptom may also be ranked certain peculiar pains of the throat and neck, which are often complained of, and seem to indicate the effect of the poison on the sensory nerve of these parts. Then follows the distinctive

* Diseases of Children, 5th edition, p. 316.

symptom of the affection, the whoop, or drawback, which is produced by the excitement of the inferior laryngeal nerve, and consequent spasm of the muscles of the glottis.*

M. Blaud, of Beaucaire, considers the primary cause of the disease to consist in an irritation of the mucous membrane of the bronchi, the result of a specific secretion poured out by the glands and follicles of that membrane, saturated with hydrochlorate of soda. The irritation from this produces the kink, when it reaches the upper part of the trachea and larynx, throwing the muscles of the glottis and of respiration into spasmodic action for its expulsion, in a similar manner to that arising from any foreign body which may accidentally enter the larynx.† Mr. Streeter is the only writer I can meet with who adopts this theory, but with the exception, that he regards the primary affection of the bronchial membrane as inflammatory in its nature. The saline mucus, he says, acts precisely as a foreign body on the sensitive membrane; and he regards it as the true and exciting cause of the suffocative paroxysms of the second stage. He supports the truth of the mucus being saline, by the testimony of adults who have been attacked by the disease, who speak of the unusual and exces-

* Monthly Jour. of Med., Dec. 1849; and Lancet for 1851, vol. ii. p. 368.

† Revue Médicale, March, 1831.

sively saline taste of the expectoration, so long as the paroxysms are severe.* An objection to this theory is the frequency of a distinctly saline tasted expectoration, occurring in many diseases of the chest, in phthisis for example, which does not necessarily produce violent efforts to get rid of it. Besides, I have treated cases, in elderly children, in whom there was a notable absence of the saline taste. I quite agree with Dr. Roe, here, that the presence of this salt must be proved chemically by those who desire to maintain this position.

Dr. R. H. Alnatt, again, considers the morbid irritability of the stomach, which engenders an irritating secretion, as the immediate cause of the spasmodic action of the glottis. This secretion, involving the bronchial tubes, trachea and fauces, spurs their exhalent vessels to inordinate action. He says, if the excretions of the stomach be examined in this stage of the disease, they will be found intensely acid, so much so as to excoriate in their passage the œsophagus, and roughen the teeth as effectually as would a dose of dilute hydrochloric acid.†

Autenrieth believes the *origo mali* to be a determination of morbid matter towards the bronchi, and hopes to divert it away by exciting morbid pustules upon the skin. Dr. Volz has

* Medical Gazette, vol. i., 1844, 1845, p. 195.

† Lancet, vol. i. 1846, p. 626.

given many reasons why it should be classed among the exanthemata. For instance, its epidemic nature, its contagious character, its attraction to children, its occurring only once in a lifetime, its relationship to measles, its regular progress, and its uninterrupted career in the individual, are all points in which it has as little resemblance to a catarrh as it has to convulsions, but which show a great similitude between pertussis and acute exanthemata. That it is seldom that any eruption is perceived in pertussis is no proof to the contrary, since in the other epidemic exanthemata, he says, cases frequently occur where there is no external eruption, but in which, nevertheless, the nature of the disease is unquestionable; and in others, again, the eruption is so transient that it is frequently not observed. Since the time of Autenrieth, the relationship between pertussis and the other acute epidemic contagious exanthemata has been suspected. Neumann (*Krankheit des Mensch.* Bd. i. s. 648) has seen pertussis accompanied by an eruption resembling measles in form, but having the colour of scarlatina, and appearing chiefly on the breast and arms. This eruption is rare, but Volz also has seen something of the same kind in pertussis. Besides the ordinary morbid appearances, Volz mentions certain changes on the mucous membrane of the intestinal canal; these are observed chiefly in the glands of that organ,

and are of the exudative kind, and such as are considered by Rokitsansky as peculiar to certain pathological processes, among which are included the exanthemata. Volz argues, therefore, if this peculiar alteration in the glandular apparatus of the intestinal mucous membrane is found not only in scarlatina, measles, cholera, and typhus, but also in gangrene, purulent deposits, &c., then it is evident that it is not the characteristic of a specific disease, but of some abnormal changes in the blood. Pertussis is therefore to be classed among the diseases produced by an abnormal change in the blood, and from the account of its occurrence as a contagious epidemic, and the numerous coincidences between it and scarlatina or measles, as already mentioned, it is improper that it should invariably be classed among the neuroses.* The resemblance between pertussis and the exanthemata has been noticed also by Jos. Frank. Dr. Watt has a leaning towards the hypothesis of its being one of the exanthemata, as shown in his observations on the third case in his book.

Dr. James Duncan has also proposed to class this affection with exanthematous diseases, and asserts that it exhibits all the more constant characters of that class of diseases. The essence of the disease he conceives to be a turgescence of the

* Haser's Archiv., Bd. iv., Hft. 3, in Monthly Journal of Medical Science, Dec. 1846, p. 461.

bronchial glands, coinciding with or arising from a peculiar fever, and the result of a specific poison ; and acting upon the pneumogastric nerves, in the way Dr. Ley supposed in the case of spasm of the glottis—viz., a reflex action caused by irritation of these nerves. Dr. Duncan gets over the difficulty of the paroxysmal character of the symptoms by assuming that the turgescence of the bronchial glands is intermittent.*

This extraordinary doctrine has been considered too hypothetical for notice by some writers ; as it is not more so than that of many others, and wishing fairly to represent the views of all here, it has received its share of attention, notwithstanding Dr. Duncan admits his opinion to be hypothesis.

Allied to the foregoing is the opinion of Dr. Guyot, the advocate for the use of coffee in the treatment. The efficacy of this remedy, he says, seems to show that the seat of the disease is not in the bronchial tubes or larynx—nor in their vascular or nervous network—but exclusively in the digestive organs, and especially in the pharynx and stomach. The cough and convulsive movements of the larynx are excited by a pruriginous irritation of the pharynx, which, again, probably depends on some special affection of the stomach.†

M. Blache is of opinion that whooping-cough is

* Dublin Quarterly Journal of Medical Science, Aug. 1847.

† Union Médicale, April, 1849.

a nervous affection, having its seat both in the mucous membrane of the bronchi, and in the pneumogastric nerves: an affection very frequently complicated with bronchitis and pneumonia, but which may exist without them; and, like all other diseases of the same kind, having no appreciable anatomical character.* Dr. Roe, MM. Barrier, Rilliet, and Barthez, and many other writers, coincide in this opinion of Blache.

My friend Dr. Arnoldi, of Montreal, considers the characteristic feature of pertussis to be the *double paroxysm*. The hoop he places little reliance on, as it is a symptom, he says, common enough in chronic catarrhs or stomach coughs. What he means by the double paroxysm is the invariable return of the cough within thirty seconds, when the symptoms, probably from the previous exhaustion, are more severe, though the patient expresses less terror on its approach than he does for the first. In contradistinction to laryngismus stridulus it is due to the eighth pair and phrenic nerves—the suffocation taking place as the result of long continued expiration; whereas in laryngismus it is the recurrent solely—the suffocation taking place at the instant of an attempted natural inspiration, without any previous unnatural expiration.

Dr. Watson, in his Lectures on Medicine, does

* De la Coqueluche. Archiv. Gén. de Méd., 1833.

not give his own views of the pathology, but makes the following important observations relating to it.—“This conjecture that the crowing inspiration of infants, and the crowing inspiration of whooping-cough—though quite distinct affections—may both depend upon irritation of the recurrent nerves, or of the pneumogastric nerve generally; and that even the irritation might in both cases arise out of enlargement of the glands which lie in the course of that nerve.”* * * * “In corroboration of this conjectural view of what *may* ultimately prove to be the true pathology of whooping-cough I may remark, that among the morbid appearances described as being met with after death from that disease, ‘an unusual swelling of the bronchial glands’ is set down.”

The view entertained by Laennec might have followed with propriety that of either Dewees or Hasse; but as I shall refer to his opinion, and that of the subsequent writers, in giving my own views of this affection, his may be given here. Laennec regards it as a variety of pulmonary catarrh, intermediate between the phlegmorrhagic or pituitous and the mucous catarrh; and from the nature of the cough has called it convulsive catarrh.

The absence or suspension of inspiration during the kinks may be accounted for in two ways, “it may be owing either to a momentary sanguineous or serous congestion of the mucous membrane of

the air-passages, causing a thickening and consequent obstruction to these canals, or by a *spasmodic contraction of the bronchi*, which would have the same effect. The discovery made by Reisseissen of a circular muscular apparatus in the branches of an inferior diameter to that of the bronchi, where the cartilaginous rings cease to be visible, will satisfactorily account for the spasm admitted by many practitioners without any other proof than the symptoms attendant upon the different diseases of the lungs.*

The facts related above, and the phenomena of several species of asthma make him regard as certain the possibility of the temporary closure of the smaller bronchial branches by a spasmodic contraction of their parietes; and he observes that the spasmodic character of pertussis is very clear from the phenomena which occasionally arise in the glottis, larynx, and even in the velum pendulum palati.

The learned author of the Dictionary of Practical Medicine, Dr. Copland, an authority most certainly of some importance in this interesting inquiry, thus enunciates his views:—"The medulla oblongata, or its membranes, are very early implicated in this disease; evidences of inflammatory irritation of these parts having been very generally

* Diseases of the Chest, by Herbert, p. 86.

observed in the *post mortem* inspections I have made. I conceive that the morbid impression or irritation occasioned by the exciting cause in the upper parts of the respiratory surfaces, particularly the glottis and its vicinity, affects the respiratory nerves, especially the pneumogastric ; and that the irritation is extended to the origins of these nerves, where it aggravates and perpetuates the primary affection.

“I believe that the disease is chiefly nervous in the simple cases ; that it preserves this character more or less throughout, even when inflammatory complications ensue ; and that in the uncomplicated state, the nervous affection never proceeds beyond irritation. The impression made by the causes, is followed by functional lesion of the respiratory nerves, particularly the nervus vagus ; and, owing to this lesion, the mucous surfaces they supply frequently experience consecutive changes, as respects the state of the circulation, exhalation, and secretion.”

In a paper on the pathological treatment of pertussis by Dr. Pidduck, he observes that :—“Pathological anatomy has supplied the principle which leads to a rational practice in this disease. It has demonstrated the existence of a congested state of the vessels at the origin of the pneumogastric and other respiratory nerves, and a more copious effusion of serum around the medulla oblongata than in

death from other causes, excepting those involving disease of the lungs and heart."

This state of the vessels at the origin of these nerves was the discovery of the late Dr. Sanders, of Edinburgh. In the great majority of these cases, Dr. Pidduck remarks, heat, redness, and tenderness on pressure indicate the state of the part subjacent, over the junction of the occiput and the atlas vertebra. The symptomatic proof, he says, of the congested state of the vessels surrounding the origin of the pneumogastric nerves is the vomiting, which frequently terminates the paroxysm—a symptom which almost invariably attends an injury done to this part of the cerebro-spinal system by the *contre-coup*, from a fall, or heavy blow on the head.*

Dr. Ogier Ward entertains the following views of the pathology of pertussis, and pronounces it "a zymotic disease affecting primarily the mucous membrane of the air-tubes and the blood, and secondarily, the medulla oblongata and respiratory nerves, producing a violent and convulsive cough, attended with a peculiar sound characteristic of the disease." He concludes that the first stage consists in an irritation of the mucous membrane of the air-passages, which, producing an increased secretion of mucus, excites the cough to remove it, as an impediment to the free access of air. The hoop,

* Lancet, vol. i. 1849, p. 640.

the peculiar feature of the second stage, he explains by the well-known excito-motory physiology of the larynx. He considers congestion or irritation of the medulla oblongata sufficient to produce the spasmodic contraction of the glottis during the hoop; and the persistence of the paroxysms to depend upon the irritation produced by either mucus in the bronchi, or food in the stomach. He thus concludes the pathology of pertussis:—"From what has been stated, we may briefly recapitulate the series of events that constitute the pathology of pertussis in the following order of sequence:—specific toxication of the blood, inducing irritation of the bronchi and increased secretion of mucus, and consequent congestion of the lungs; toxication, and congestion of the brain and medulla oblongata by the blood, now rendered still more vitiated by the pulmonary congestion, which, producing specific irritation of the respiratory nerves, renders them more easily affected by slight stimuli, and causes irregular contractions of the muscles under their influence, so as to produce a spasmodic cough of a peculiar kind."*

The views of Dr. Ward are, in some measure, allied to my own, which I hope presently to show.

Dr. West, in the last edition of his work on Diseases of Children, published in 1852, refrains from discussing the theory of the nature of the disease;

* *Prov. Med. and Surg. Jour.*, 20th Oct. 1847.

Dr. Churchill, however, whose work preceded that of Dr. West above mentioned, enunciates his own views as follows:—"Now, without attributing it to organic disease of the brain or spinal marrow, we cannot but refer the peculiarity of this cough and whoop to a state of the nervous system analogous (shall I say) to that which gives rise to spasm of the glottis. In other words, that hooping-cough is also a case of reflex irritation of the nervous system, excited, no doubt, by other and different causes, but experiencing a similar transference of effects."* Dr. Churchill believes that we are at present quite ignorant of the nature of the peculiar exciting cause; we know that it exists, and that when it is applied, the primary irritation of the mucous membrane arises, followed by the reflected nervous irritation which gives rise to the peculiar phenomena of the disease.

In a clinical lecture delivered by Dr. Todd, at King's College Hospital, on hooping-cough,† he pronounces it a disease depending upon some peculiar irritation of the vagus nerve, the irritation being quite as complete as when the nerve is mechanically stimulated. The cough differing, however, from that produced by mechanical irritation of the nerve, in its coming on in paroxysms

* Diseases of Children, p. 215.

† Medical Times and Gazette, 4th March, 1854. This work was ready for the press when Dr. Todd's lecture was published.

at longer or shorter intervals from each other, the patient's health during the intervals being good.

"This paroxysmal character of the disease, with the complete state of health in the intervals, except when the constitution or the lungs have become damaged by the effects of the cough, associates hooping-cough with other diseases, the peculiar phenomena of which depend upon some poison in the blood, manifesting its presence by the specific action which it exercises upon some particular tissue, and by the interference which it seems to offer to the due performance of healthy function.

"For certain poisons undoubtedly appear to have a peculiar affinity for certain tissues, thus the poison of measles appears to have a special affinity for the mucous membrane of the bronchial tubes and bowels, that of scarlatina for the throat, and so on of the other acute specific diseases. In like manner the poison, which gives rise to the phenomena of hooping-cough, seems to have a peculiar affinity for the vagus nerve; but whether throughout the whole course of that nerve, at its centre or its periphery, it is impossible, in the present state of our knowledge, to affirm with any degree of accuracy.

"The poison in hooping-cough, whatever it be, produces no structural lesion in the nerves, and leaves nothing behind it, of which our senses can take cognizance."

Dr. Todd concludes his views of the pathology as follows:—"Hooping-cough, then, as far as present knowledge enables us to speak, is a disease which runs a certain course, can be communicated from one person to another, and is probably due to the influence of a poison which gets into the system, and produces its local manifestations on the vagus nerve. It is not an inflammatory affection of any part, being simply dependent on a morbid state of the blood, caused by the introduction into it of some poison from without; and whatever inflammations may occur in the course of it must be regarded in the light of complications of the disease."

I shall appropriately conclude the series of observations just given, from so many writers, with the following from Dr. Carpenter, taken from his *Recapitulation of the Functions of the Nervous System*.* There are many spasmodic affections of a more limited character, he states, which are traceable to a morbid affection of some particular division of the spinal axis. "Thus in the various forms of *spasmodic asthma*, the medulla oblongata would seem to be alone involved; the attacks of this disorder usually resulting from some internal irritation, either in the air-passages themselves, or in the digestive system, producing a reflex contraction of the muscular fibres of the bronchial tubes. In

* Principles of Human Physiology, 4th edit., 1853.

the purely spasmodic stage of *hooping-cough*, again, which frequently persists long after all inflammatory symptoms have subsided, we have another example of spasmodic action limited to the respiratory centres; and here we have distinct evidence that the morbid condition originates in the introduction of a poison into the blood."

If we now review the numerous and varied opinions just given, of the many writers who have devoted much research in estimating the nature and seat of pertussis, we are at once struck with the diversity which prevails. We cannot affect surprise at this, however, when we reflect upon the time at which many of their observations were made, as it is comparatively only of late years indeed, that such onward progress has been made in our knowledge of both physiology and pathology, more particularly in relation to the functions of the different organs.

But there is one very important fact nevertheless, which cannot escape notice, and which proves the truth of the last remark, when it is observed that there is a good deal of unanimity on certain points, among the more recent writers, in their notions of this disease; this is a fact which affords matter for much congratulation, and will tend in a great measure to settle a question which has appeared to prove an enigma for so long a time. The views

of Churchill, Ogier Ward, Todd, Pidduck, Carpenter, Blache, Roe, Thomas Watson, Copland, and Laennec, may be mentioned as examples of this.

By this remark, it is not intended that the opinions of many who have preceded these, are to be disregarded, or considered as of no value; on the contrary, they have assisted in some measure also in the solution of the question.

It is not unworthy of notice, that the earliest writers on the subject, Willis and Sydenham, should have considered the blood influenced by the disease,—the latter more particularly, who regarded it as the seat of it. Not a few, again, have attributed it to causes of a miasmatic nature; in other words, toxication of the blood. And the causes which induce asthma have been pronounced also likely to produce it; and laxity of the fibres has not been overlooked.

These are here indirectly mentioned, as bearing, to some extent, on the modern views of its nature and pathology.

The observations of Dr. Ogier Ward have tended pretty clearly to establish some important points in relation to the affection, and which may be now looked upon as settled, as modern investigation and research appear to confirm them.

What he describes as “toxication of the blood,” is so significant and distinctive of the certain pre-

sence of a something in that fluid, whose nature never can be determined or explained, unless minute analysis hereafter may throw some light upon it, that we are justified in accepting this expression as signifying the first condition or essential essence of the disease. This very important point in the commencement of the chain is therefore set at rest.

“The toxication of the blood induces irritation of the bronchi and increased secretion of mucus, and consequent congestion of the lungs.” The fact is undisputed about the irritation and mucus secretion; but I am not prepared to admit the congestion of the lungs in the full sense of the term.

How is this irritation produced? The blood having thoroughly imbibed the poisonous influence, is exposed in the air-cells of the lungs for the purpose of oxygenation, when the peculiar nature of this unknown influence commences to develop itself, by irritating the terminal loops of the nerves supplying the mucous membrane in the minute tubes at first, and subsequently spreading to the larger branches. This irritation is followed by increased vascularity, and, as a consequence of both combined, the secretion of mucus arises, which is natural to the membrane itself, but much increased in quantity, constituting in its manifestation the first or catarrhal stage of the disease. Such, I feel persuaded, is the natural explanation of this phenomenon.

The continued presence of this secretion now acts in its turn as a direct irritant on the minute branches themselves, which furnish the terminal loops; and they convey in their unity, by reflex action, this sensation to the medulla oblongata and origin of the respiratory nerves, which, being followed by congestion at those parts (and not in the brain generally), produces, as a consequence, violent and strong expiratory efforts, and a spasmodic contraction of the circular and other muscular fibres of the bronchi to get rid of it. These spasmodic contractions will continue, followed by the hoop or sonorous back draught, so distinctive of the disease, until the whole of the offending mucus has been expelled, with the assistance also of the act of vomiting, which appears to be the concluding phenomenon of reflex action.

I do not believe that the pharynx and larynx are primarily affected at all, because, if the chest is examined at the onset of the disease, the physical signs clearly point out the presence of mucus secretion in the smaller bronchi.

The views of Dr. Todd are very clear and satisfactory, and equally express the truth of the principal peculiarities of the disease, the toxication of the blood, and the irritation of the pneumogastric nerves as the consequence of, or the resulting condition of the manifestation of the former. It is satisfactory also to have the testimony of such an

authority as Dr. Todd, in support of there being no inflammatory element in the disease, unless it may occur as a complication.

Dr. Copland has not overlooked the state of the medulla oblongata or its membranes, having found evidences of inflammatory irritation of those parts; I conclude, however, that when the appearances have been distinctly inflammatory, the disease has been complicated, and that congestion only, which may be pronounced inflammatory irritation, if it is thought proper, is a necessary accompaniment of the disease. Dr. Pidduck and Mr. Sanders maintain this view, with the addition of serous effusion around the cord, free from disease of the lungs or heart. Under such circumstances, should serum in small quantity be found with congestion, and free from any complication, coupled with the manner of death—say from asphyxia—it is not unreasonable to suppose that the effusion may be post-mortem. I agree with Dr. Copland, also, in the observation that the pneumogastric and other respiratory nerves are affected at their terminal extremities primarily, and subsequently by extension to their origin; and that there is a lesion in function of the former. I cannot go so far as to pronounce with Dr. Ward that congestion of the brain is present, for I think there would be some remarkably prominent symptom to show it,—the mere violence of the cough will not prove it.

Laennec appears to be the first writer who supposed the absence of respiration was due to spasmodic contraction of the muscular fibres of the bronchi, although the term spasm has been used by others before him, without knowing its true seat; he, however, refers to the *circular* muscular apparatus described by Reisseissen, to explain it. These fibres are particularly described in the chapter upon the Anatomy of the Lungs. I have adopted this view, and have *confirmed the truth of it*, by the discovery of these fibres being hypertrophied in the simple form of the affection. Laennec's reference to the phenomena of several species of asthma also supports the analogy which exists to some extent between these two affections.

The hoop is a mechanical phenomenon again, consequent upon spasmodic contraction of the glottis. The series of expiratory efforts driving the air against the margins of the glottis may be the cause of the reflex action, producing spasm and partial closure the instant they have ceased, and permitting this single but sonorous inspiratory sound.

That able physiologist, Dr. Carpenter, adds his testimony to the presence of spasmodic action limited to the respiratory centres, and persisting often after inflammatory symptoms have subsided.

To sum up, then, my own views of the nature, seat, and pathology of hooping-cough, arrived at

after long and mature deliberation, they amount to the following declarations:—

1. Toxication of the blood, produced by some unknown specific influence, peculiar in its nature, not unlike that of measles and scarlet fever, in the circumstance of its affecting persons once during their lives, generally children under five years of age.

2. Irritation of the terminal loops of the nerves supplying the mucous membrane of the bronchial tubes, producing vascularity and consequent secretion of a greater or lesser quantity of mucus.

3. Reflex action of the pneumogastric and respiratory nerves, followed by congestion of the vessels of the medulla oblongata and pia mater surrounding it, and also at the origins of its nerves.

4. Spasmodic contraction of the circular and longitudinal muscular fibres of the bronchi, consequent upon the foregoing, manifesting itself in the series of sudden expiratory efforts, and the well known sonorous back draught or hoop.

5. The immediate result of which is frequent and rapid respiration to compensate for its temporary absence, producing a highly oxygenated or super-oxidized state of the blood, with a tendency to the formation of fibrinous concretions in the heart during the spasms.

6. As a secondary result of the spasmodic muscular contraction of the bronchi, we have a tempo-

rary hypertrophy of the muscular fibres thus acted upon, which disappears again after the cure is established.

7. The disease is at first irritative and catarrhal, and afterwards nervous and spasmodic, both due to the unknown peculiar exciting cause, present in the blood.

8. It manifests the peculiarity of running a special course, through its different stages, three in number, but which may be cut short, or greatly diminished by medicinal treatment.

CHAPTER XIII.

PERTUSSIS A DISEASE OF ALL CLIMATES.

It has been stated by some writers of authority that pertussis is a disease of all climates; by others, again, this has been disputed, particularly by those who deny the antiquity of the disease.

That it is a disease of almost every habitable portion of the globe, whether civilized or barbarian, cold, warm, or temperate, north or south, I am very firmly convinced, and shall endeavour, so far as my means of information will permit me, to prove the correctness of this assertion.

The plan most useful for adoption will be to consider the subject geographically, taking the continents first, with their subdivision into kingdoms, and the islands scattered over the globe either isolated or in connexion therewith.

If it will be admitted that all climates and regions are under the influence of whooping-cough, then I will be bold enough to declare that, taken with other evidence, for which I refer to the chapter on the History of the Disease, that its antiquity will date as far back as the earliest periods mentioned in the sacred volume of Holy Writ, and

that, in its antiquity, it is by far more ancient than small-pox or measles, both of which diseases can be traced by recorded evidence to a very remote period of time.

Assuming thus much, the continent of Europe shall be first noticed.

Europe.—Almost every country in Europe has had its epidemics of this disease noticed by various writers, whose names alone would occupy many pages. If the testimony was as numerous in other quarters of the globe, it would not have been necessary to write the present chapter, short and imperfect though it is. I shall therefore glance over its recorded evidence, and mention here and there writers of particular countries.

Of the epidemics described by De Thou, Senert, Sauvages, Riverius, Baillou, and many others, in 1510, 1557, 1580, 1757, 1767 and 1769, many of them spread over almost the entire extent of Europe, and were very fatal indeed. That mentioned by Riverius, in 1557, is described as especially spreading almost over the whole of this continent; and that by Baillou, in 1578, was equally migratory.

Of individual nations, however, commencing at the north, we find that Norway and Sweden appear to be most particularly favourable to its development. In Sweden the records of mortality at all times appear high, as shown elsewhere in the

present work. Rosen has described the number of deaths in that country alone from 1749 to 1764 to have been 43,393; Linnæus has written also on the disease in the same country.

In Finland it is equally prevalent with the two last-named countries; the deaths in Sweden and Finland were as 1 to $13\frac{1}{2}$ of the entire mortality; and it is no stranger throughout the immense empire of Russia, extending to the borders of the Black Sea, not even excepting Circassia and Georgia. A work on the disease in that empire, by F. C. Metzger, was published at St. Petersburg in 1791.

The German empire has furnished a vast number of writers on this affection, which appears to have specially engaged their attention in almost a spirit of rivalry. This proves that in Central Europe it is a very prevailing malady. Of the towns in Germany, the disease, mostly in an epidemic form, has been described in Gottingen by Klluger, Brendel, and Klinge; in Wurtemberg by Nurnberger; in Frankfort by Hartmann and Mellin; in Hamburg by Unzer; in Helmstadt by Holdefreund, who speaks of several epidemics; in Bemerkungen by Thilenius; in Leipsic by Pohl and Löbenstein Löbel; in Mayence by Arand in 1769. Dans, Kopp, Marx, Jahn, Haller, and numerous others, have scarcely excepted a single town or village from its influence.

In Prussia, Paldamus, Hoffman and Alberti describe epidemics in their works published at Halle; Geller, one in 1757, in the duchy of Magdeburg. Hufeland, of Berlin, has also added to the literature of the subject; and Styx, Schaeffer, Michaelis, Hargens, Streuve, Hinze, Kortum, Conradi, Sulzer, Winckler, and a great many others, have not left an isolated spot in Prussia, or even in many of the minor kingdoms of Germany, free from this disease.

In the Austrian empire, the literature has been nearly as extensive in the description of various epidemics of hooping-cough. In Vienna and Hungary, these have been particularly dwelt upon by Stoll and Frank; in Saltzburg by Schaeffer and Wezler; and in Prague by Kochler. All the provinces of the empire, extending to the confines of Turkey, are influenced to a greater or lesser degree, as is shown by the German writers.

Holland and Belgium have had their writers upon the disease; it has engaged the attention of Eyerel, Ranöe, Ström, Von Berger, De Meza and others. Lando has described the epidemic of 1806 at Geneva, in Switzerland.

In Denmark epidemics have raged with great severity at Copenhagen and other places, as mentioned particularly by Aaskou, who describes the one at that capital in 1775, as also does Bang in 1784; Buckhaave is another Danish writer.

This conducts us to the British Isles, where, unfortunately, the disease is not only too prevalent, but very severe indeed at certain periods, in every village, town, and city throughout the empire: no testimony is required to prove this.

In a north-westerly direction, the island of Iceland, which, from its isolated position, some might consider to be exempt, no immunity from the affection is manifest, and the mortality amongst children, in proportion to other affections, is tremendous. Madame Ida Pfeiffer, when travelling in that country in 1845, writes under the date of the 20th of June:—"The kvef, a kind of croup, prevailed this spring to such an extent that scarcely any one escaped it. Wherever I went I found the people afflicted with this complaint; and here this was also the case, the noise of groaning and coughing was quite deplorable." The affection she describes is most clearly the whooping-cough, as no other disease possesses such universal characters, and her description suffices to prove it.

In France the disease is as well known as in Britain, and is equally universal in its distribution; a very numerous body of writers have enriched the literature of the subject.

Spain and Portugal possess it, but we do not hear of the severe epidemics in those countries which have prevailed in others. This may be owing to the same reason that will apply to

Turkey,—that very few, if any, have written upon the subject.

In Italy, epidemics have been described by Panzani in Istria ; Straack and Metternich at Ticino ; Boehmer and Kreysig at Viterbo ; Penada at Verona, in 1815 ; and Ozanam at Milan, and other parts of that country.

All the northern shores of the Mediterranean, with their various towns, and the numerous islands, particularly of the Grecian archipelago, are visited by the disease. And Turkey and Greece are not more exempt than any other European state.

Hooping-cough, therefore, certainly bears a very strong European aspect, as no part whatever of this continent has been left free from its invasion ; our knowledge of this fact is due to the state of medical literature, which appears to have its supporters in almost every kingdom, and is daily adding to our information upon so many important subjects, in relation more particularly to epidemics and their causes.

Of *Asia* generally, our knowledge will for some time remain limited, but from the nature and severity of the climate in various portions of it, together with the remarkable changes in temperature, we may most reasonably assume that pertussis is not unknown, but equally prevalent in Siberia, Tartary, China, and other portions of that great continent. The accounts of travellers

tend to prove this, for, although they may not describe the affection, they speak (Huc particularly) of the "horrible climate, ever gloomy and frozen," and the extreme rigour and severity everywhere met with.*

So far as our important and large possessions in India relate to the question, something more positive can be pronounced.

In the Medical Report of the 22nd regiment of Native Infantry, stationed at Malligaum, (a town situated about 120 miles in a north-easterly direction from Bombay,) in 1843, the following appears:—"Hooping-cough first showed itself in January, and continued to prevail for several months among children; attacking, also, very severely, a number of grown-up persons, with whom the whoop was as distinct as in children."†

Mr. James Ranald Martin, whose name, as an authority upon medical matters in the East, stands deservedly in such high estimation, informs me that hooping-cough, in common with all other diseases of infancy, goes through its course mildly in India. Such was his experience during several years of practical observation in Calcutta, where he found that in its nature and duration the disease was mild as compared to its course in Europe. He found, also, that the complications in

* Huc's Travels in Tartary, &c., vol. ii.

† Trans. Med. and Phys. Soc. of Bombay, No. 7, p. 126.

its progress were of very rare occurrence in India, and when they did occur they proved comparatively mild and tractable. He observes that the favourable course of infantile diseases in general within the tropics, may be referred to the equable determination to the surface of the body there, caused by a high temperature. And thoracic disease in every form is, moreover, of comparatively rare occurrence within the tropics, where the great majority of diseases affect the abdominal organs.

We have no reason for supposing that Persia, Arabia, and Asiatic Turkey possess an immunity from it. If it reaches the confines of the last, and extends to the northern shores of the Black Sea, it may equally affect the southern shores, and the countries adjacent. I could have wished to have given more positive testimony in regard to Turkey and Arabia from the number of associations which connect themselves therewith, more particularly in relation to the antiquity of the disease.

The entertaining and instructive volumes of Dr. Layard do not contain any passing notice of this affection, and the author himself informs me that he never met with any case of the disease among the children of the Arabs. The testimony of Mr. Wilde is equally negative, his entertaining volume of travels does not mention it; and he likewise informs me that he never saw it.

Small-pox, on the other hand, is a common

disease in Persia and Arabia, and, in fact, all parts of Asia ; Huc, Madame Ida Pfeiffer, and others, speak of having seen it. Hooping-cough has nothing about its appearance to attract the notice of travellers.

In relation to the northern part of *Africa*, at the present time, I have been unable to glean any positive intelligence: Mr. Wilde, who has visited Algiers and Egypt, can afford no information as to the disease being one of that part of the continent. The inference, however, might be drawn, that if it is met with in the northern shores of the Mediterranean, most probably it will be found as an affection equally prevalent in the southern shores, more particularly when the geographical peculiarities of this sea are considered ; besides, this part of Africa is in the latitude of from 30 to 37 degrees north, and, therefore, distant from the tropic of Cancer, a circumstance likewise favourable to the supposition of its presence here.

In the Island of Madeira, which may be considered as belonging to this continent, an epidemic of hooping-cough has been described by Dr. Fretis, which prevailed in 1808, and which is said to have spread immediately after the landing of British troops under General Beresford, and destroyed a large number of the inhabitants.

My friend, Dr. Alex. Gibb, of the Army Medical Staff, who served for many years in Southern Africa,

informs me that he has seen it there towards the eastern frontier and Kaffraria. He remarks that it is not endemic, but is propagated and introduced by arrivals in the colony from other parts of the world, and thence spreads by contagion through the different districts. The general features of the disease resemble the European form, especially among European children; a much milder form prevails among the natives, who are very slightly affected, and few of them take it at all; which, he says, is perhaps owing to their living in well ventilated huts, and their being so much in the open air.

The chief danger is from pneumonic congestion, which is the most fatal chest disease in the country, many natives dying from pneumonia. Pertussis is sometimes very protracted among the European children; and change of air is most necessary for a cure. From the nature of the climate, which, he says, is almost the finest in the world—the air being remarkably pure, clear, and unusually dry—the disease is extremely mild, and very rare.

North America.—The children of the various Indian tribes scattered throughout this continent are subject to the disease. In the large territories of the Hudson's Bay Company, I am informed that hooping-cough is no stranger, and very few families escape its influence. I can speak from experience of the fact of many of the tribes in the Canadas, particularly on the banks of the Ottawa River, at

the Lake of Two Mountains; at Caughnawauga, opposite Lachine, a distance of nine miles from Montreal; at Lorette, some miles below Quebec; and numerous other places; and no appreciable difference is found between the disease in them and in the children of the white man.

Sir John Richardson, who is so well known as an Arctic traveller, informs me that in 1819 whooping-cough was endemic, and very fatal among the Cree Indians that frequent the banks of the Saskatchewan and Nelson Rivers. It affected old and young, and in some instances carried off entire families. It was said to have been imported from England. He never heard of it among the Esquimaux, nor is he aware that it has ever prevailed in the country of the Tinnè nation, that intervenes between the Cree and Esquimaux lands. It certainly did not, he observes, during the seven years that he spent in those countries, but may have done so at intermediate periods.

Dr. Barclay, the respected secretary of the Hudson's Bay Company, tells me that the Esquimaux are free from this disease, and that no information has been obtained that they are subject to it. The Esquimaux are some distance from the Cree Indians.

In the Canadian provinces, both Upper and Lower, the disease is well established, and often rages with great severity, particularly in the Lower.

When travelling in the country parts in the winter time, I have come across whole families among the *habitans*—the French Canadian settlers—who were suffering from it, and without visible complications, although it is well known that a large number are carried off by this disease in the Lower Province. It is said also to infect the Indians and settlers on the Labrador coasts.

The Provinces of Nova Scotia, New Brunswick, Newfoundland, and the Island of Prince Edward, have it to an equal extent with the Canadas. And even the Island of Anticosti, situated in the Gulf of St. Lawrence, and which seldom has more than two or three families upon it, does not escape, as I was informed by a relative who passed a winter upon it for the purpose of hunting.

The testimony of the many respectable writers in the United States clearly proves it to be common to every state in the Union, not excepting those most recently acquired; and notwithstanding the magnitude and extent of country which is comprised within the area of this great kingdom, the enterprise of its people promises a future knowledge on every branch of medical science, not in any way inferior to the extensive literature of Europe. It is a most gratifying circumstance to observe also, that owing to the spirit of topographical and medical inquiry, which is becoming everywhere manifest throughout the almost as yet

unexplored portions of Canada and the United States, we may expect to reap in the course of time a most abundant and ripe field of literary harvest.

Of Mexico and Central America nothing certain can be said, but there is no reason for supposing them to be exempt.

West Indies.—The islands constituting this group have been proved on the testimony of medical writers to be subject to the disease, but whether it is modified to the same extent as in other warm climates, it is impossible to determine.

Dr. Hillary mentions that it is equally as infectious in Barbadoes among children, as either small-pox or measles is. He writes that it appeared in the month of July, 1753, after a great fall of rain, when there could be no suspicion of the infection being brought there by any person whatever.

Sloane and others have described the disease in Jamaica, the first as far back as 1707.

South America.—The regular commercial intercourse between the various states of this continent and those of other countries has been the means of affording information which otherwise might not have been available. The personal testimony of travellers, and residents of respectability in the republics of South America and the empire of the Brazils, has satisfied me of their non-exemption, in common with other lands, from this affection. But so far as I have been enabled to learn, it is more

prevalent in the southern part of the continent than elsewhere, attributable possibly to the more varying nature of the climate.

In the northern portion, Guayana for instance, whose unhealthy climate has proved the grave of so many, it is prevalent among the natives and settlers. The natives are in the habit of using a plant for the cure, known by the name of corowatti, as described by Dr. John Hancock, in the *Lancet*, in 1831. It will be remembered, that the southern confines of Guayana are upon the verge of the equator; and although the disease may possibly be here modified by climate, the great heat does not necessarily prevent its existence. Ozanam has stated that it never shows itself between the tropics, with what truth, this chapter illustrates.

Australia.—If a description of the climate and the nature of the diseases which are prevalent on that continent be considered, so far as they have become known, the conclusion that hooping-cough is occasionally present will most certainly be adopted. The dry, warm, and elastic atmosphere has been pronounced peculiarly favourable to asthmatic and pulmonary complaints; and children and infants not only appear to be free from many of the severer diseases of other countries, but increase and multiply to an astonishing degree.

In a work published by a medical writer on that country, he observes:—"Rheumatism and catarrhs will prevail according as the individual's system is

capable of resisting the influence of atmospheric changes;" and he mentions, further on, that precautions will be necessary there, as elsewhere, to guard against the effects of alternations of temperature.

We find in consequence that hooping-cough *is* a disease of Australia, and for the knowledge of this fact, in completing a very important link in the chain of evidence, I am indebted to the Rev. David Mackenzie, of Edinburgh. This gentleman has spent eighteen years in Australia, but never met nor heard of an example of the disease. He, however, has very kindly taken some trouble to ascertain that it is an Australian malady, but exceedingly mild, and most probably comparatively rare.

He informs me that he had learned from the wife of a clergyman, who had recently returned with her family after a residence of some years in New South Wales, that two of her children had the disease in the colony, which was well authenticated, but extremely mild as compared to what she had formerly witnessed in Scotland. The two children of another lady had something like it, but they never hooped.

It has not been observed among the black aborigines, but as they suffer severely from other European diseases, we cannot consider them to be exempt from this.

In Van Diemen's Land, out of 3475 cases of disease treated in the hospitals in 1848, 357 were of the lungs, 47 of which died, the entire mortality from all causes being 166. The winter approaches more nearly to that of Europe, but is infinitely milder than in the British Isles. In New Zealand, again, the climate is several degrees colder than in any part of Australia. These circumstances, taken together with the fact, that affections of the chest form so large a proportion of the diseases of the former country, and proving at the same time the most mortal, convincingly proves that hooping-cough is not a stranger to these colonies.*

Polynesia.—Small-pox has ravaged many of the islands of the Pacific almost to the extinction of their inhabitants. The presumption is, that hooping-cough may not be unknown among them, but we have no direct evidence to prove it.

* While these pages were passing through the press, I have been informed by a lady and gentleman, who have just returned from Melbourne with their family, that hooping-cough is not only a frequent, but a very severe and fatal disease in Australia. A large proportion of the children die of this disease, complicated with convulsions. So severe are the paroxysms that hæmorrhage is produced from the nose, mouth, eyes, and ears. It appears also that the disease is more severe in the warm summer season, owing to the arid and hot atmosphere. One of their own children, a little girl, suffered so much from the disease, that her life was despaired of, being complicated with hæmorrhages and threatening convulsions.

CHAPTER XIV.

CAUSES, DIAGNOSIS, AND PROGNOSIS.

CAUSES.—In dwelling upon the causes of pertussis, the age, sex, predisposition, temperament, constitution, and manner of life must be considered, as well as climate and season, and more especially epidemic and contagious influences.

1. *Age*.—Though sometimes met with in adults and old people, it is for the most part almost exclusively the disease of early life, and if met with in the former it is because they have not had it during their childhood, and therefore are readily affected when exposed to contagion. The disorder protects the system, as it were, with very few exceptions, from its future recurrence. I have mentioned instances elsewhere of second attacks, and I believe again individuals may pass through life without an attack of it, should they have been ushered into the world when the mother has been suffering from the disease, as has been already referred to in the chapter of complication with pregnancy.

There does appear to be something in the constitution of the child, which renders it peculiarly susceptible to its influence ; and Barrier remarks

that this predisposition is similar to that which favours the development of the eruptive fevers.

Dr. Watt says that it is more than probable that the remarkable change which takes place at the age of puberty in the larynx, trachea, and bronchi, may have no small share in either rendering the system less susceptible of the disease, or in rendering it less fatal when it does occur. And Dr. West, again, observes that still fewer of those who escape it when children suffer from it in after life.

There occurred in London during the eight years 1842 to 1849 inclusive, 14,233 deaths; of this number 13,434 were under five years of age, 8911 were under two years of age, and 4495 were under a year old. Above ten years there were 146, and above fifteen there were twenty-eight.

Age, therefore, is undoubtedly a predisposing cause, and especially under two years.

2. *Sex*.—Boys and girls are of course equally exposed to the attack; but we find that, according to the researches of Blache and Constant, a greater number of boys arrive at maturity without having had the disease. Blache proved the proportion of such cases to be seven boys to six girls, and Constant three boys to two girls. This may probably account for the fact that among adults and even old people, males appear to be more numerously affected than females, and most of the instances mentioned as examples turn out to be males.

Dr. Copland, however, mentions that females are oftener attacked among adults than males. Guer-sent thinks that among men it particularly affects those who are irritable and nervous, and who, from their temperament, very much resemble the constitution of females, and therefore are more susceptible to it.

As to its frequency, Dr. West observes: of 100 cases of hooping-cough at the Children's Infirmary, 55·3 per cent. occurred in females, only 44·7 per cent. in males; although the total number of female children to the total number of males among his patients at that institution was only as 50·2 to 49·8. He says also that female children are not only more liable to the affection, but it proves more fatal to them than boys, in the proportion of about three to two. Of 27 fatal cases that came under his notice, 16 occurred in female and only 11 in male children.

Aberle mentions that in 31 deaths under his care, only 10 were males.

In Sweden the deaths for 25 years, from 1806 to 1830, were 50,822, or 23,616 males and 27,206 females; although the sexes were nearly equal in the deaths from 1749 to 1764, there being 21·543 males and 21·850 females.

In Ireland, for 10 years, 1831 to 1841, the deaths in the proportion of the sexes, were 100 males to 115·43 females.

In London, for 12 years, 1838 to 1849 inclusive, the deaths were 20,824, of which 9290 were males and 11,534 were females. And in England, for a period of eight years, the deaths were 65,331, of which 29,188 were males and 36,143 were females.

The fact is perfectly clear that it is not only more frequent in the female sex, but also much more fatal than in the male sex.

3. *Temperament, Predisposition, and Manner of Life.*—Lymphatic and nervous children are more especially predisposed to the disease. A nervous temperament combined with a weak and irritable constitution particularly favours its development.

Dr. Butter observes that “the nervous system bears a much larger proportion to the other solid parts in children than in adults; the solid parts are likewise of a much softer texture and of a much quicker growth; the human body is then endued with much more irritability than at any other period of its existence,” and consequently more easily affected.

“One can hardly doubt,” says M. Gendrin, “that, owing to the development and extreme activity of the circulation and the permeability of their tissues, that infants are in the most favourable state for the absorption of miasmata.”

These conditions also influence to some extent the nature of the complications which so often

arise during its progress, and especially produce convulsions. The sanguine temperament predisposes to the occurrence of epistaxis and many of the inflammations, particularly pneumonia; and if the lymphatic temperament is strongly marked it may increase the catarrhal affection, and sometimes lead to dropsical effusions.

The children of the rich, brought up with every comfort and luxury, are equally affected with the children of the poor. Damp habitations, however, which are also gloomy and unwholesome, a want of proper clothing, noxious vapours and improper sewerage, seem to exercise a real influence in producing the disease.

The last of these appeared to be an exciting cause of the fatality in the son, aged nine months, and two daughters, aged respectively four and five years, of a brewer, who died on the 4th, 2nd, and 10th of February, at 6, Waterloo-street, Camberwell, of this affection, influenced doubtless by an open sewer a few yards from the house where these children died, and which emitted a most offensive smell. In the last case the pertussis was followed by scarlatina maligna.*

4. *Climate and Season*.—It is observed to be much milder in warm than in cold climates; and it is also more frequent in the cold than in the

* Weekly return of births and deaths in London, ending Feb. 11th, 1854.

warm months of the year. Climate has much influence upon the mortality, but very little upon its presence or extension. In the cold countries of the north, as shown in the chapter devoted to climate, it is not only very prevalent but very fatal; it is less frequent and much less severe in the south and near the tropics, as a general rule, although there may be exceptions, as in the fatal epidemic in Madeira, in 1808, but the climate of that island is modified from its isolated position in the Atlantic Ocean.

It would seem to be in conformity with this law, that the disease is found to be more severe in this country during winter and spring (some say it is of longer duration in autumn and winter), than in summer and autumn.

Dr. West mentions that the epidemic of 1841-2 reached its acme in the months of December and January; while in 1845, cases of hooping-cough were by far more numerous in the months of June and July than during any other period of the year.

One year it may be very mild, simple, and rapid in its progress; the year following, or even another part of the same year, it may be accompanied with serious complications, and may last many months. Dr. Watt's tables show that March was the most fatal month, and July, August, and September the least.

Notwithstanding the following observations of Ozanam, temperature most certainly does influence the frequency and the severity of the disease, else why should cold climates produce opposite effects to those of warm:—

“This disease does not depend upon any defect in the air, nor in the atmospheric variations; because it reigns at all seasons of the year, and when it shows itself in the country, it may continue for a long time, in spite of the changes in the seasons. It is equally met with in the cold countries of the north, in the temperate climates of Europe, and in the warm regions of Italy.

“If it depended upon modifications of the atmosphere, it would declare itself at the same time in all those countries submitted to the same influence, whilst sometimes it confines itself to a town only or its environs, or even is restricted to certain families, or to certain asylums for children. Cold does not render it more severe, because we frequently see it cease on the approach of winter, and in giving cold baths, and drinks of ice-water, it quiets the paroxysms.”

His reasoning is not logical, and if he draws his conclusions from the severity of the epidemics at Milan, which were not in the winter season, and that in consequence, cold and a low temperature produce no effect in increasing both the severity and the frequency of the disease, he is in error.

The records of this disease in colder climates, and the mortality in the colder seasons of the year, as compared with the warm, are a sufficient answer to his remarks. And although the disease may reign at all seasons of the year, it is most unquestionably severe when the temperature is low, and if the season is cold.

In France, it appears that the disease is more prevalent in spring and autumn, throughout the years which are cold and damp; and the agency of a cold and moist atmosphere in its production is much insisted upon by Richter, Marcus, Desruelles, and others. There can be no doubt, also, that it is in some way connected with other epidemics, often appearing just before, during, or immediately after an epidemic of measles or influenza.

5. *Contagion and Epidemics*.—Pertussis is unquestionably a contagious and an epidemic disease, and in some instances would appear to be an endemic or sporadic affection. The contagion appears to be communicated with great facility. When once it gets into a family, it generally attacks every child; mothers, nurses, and even fathers, who have not had the disease, will often contract it from their children; and it has under such circumstances occurred twice, and instances are mentioned of three times. Mothers, who have had it in their childhood, will become affected a second time through the child at the breast, or the other chil-

dren suffering from it. Guersent, Copland, and others, mention such instances.

It is quite clear that children who have not had it, are predisposed to take it in consequence, either from contagion or when it is reigning as an epidemic. This is borne out by the fact, that perfectly healthy children, without any cough or cold, are attacked by it, after playing with other children suffering from it, and this again has been communicated soon after to all the other children in the same house, as well as to many others, both children and adults, who come in contact with them; I have met with such instances, and so has almost every writer. Cases have been removed to a distant part of the country and into families where it did not exist, and it has been readily communicated to those who had not previously had it.

Dr. Hamilton mentions that infants a few days after birth have been affected, in consequence of being handled by persons who had been in a house where the disease was prevailing. This is a striking proof of contagion by transportation from one place to another.

Barrier gives the history of a family of three persons, the parents and child, who took the disease from contagion. He relates that the child at school sat next to two others affected with whooping-cough, and in three days caught it from them, and

it turned out very severe. The child's bed was next to that of its parents, and in consequence the mother, who was constantly attending its wants, during the night particularly, and whose age was twenty-four years, took it; her husband also, aged thirty-seven, did not escape, and all continued hooping for the space of six weeks, when they got well.*

Rostan gives the following instance of its contagious nature, which has been quoted by Dr. Roe.† “A family on going to their country seat found their gardener's children in the hooping-cough; in a few days one of the family, a boy of four years of age, who had been playing with the infected children, contracted the disease, but the other children, who were kept separated from them, did not then take it; and afterwards the whole family—father, mother, servants, and children—who had any communication with the infected family, went through the disease.”

Rosen admits without hesitation its direct transmission. He says he himself has transported it from one house to another. Duges gives instances of it, and Blache a dozen well-established examples, most of which were observed by himself. He mentions the case of a child giving it to its grandfather and grandmother. Another child to its

* *Maladies de l'Enfance*, tom. i. p. 135.

† *Clinique Médicale*, tom. ii. p. 552.

grandfather, an old man aged seventy. Guersent gives the case of a little boy, who, having played with another child for half an hour, who had the disease, the second child returned to his home in the country, when the disease showed itself and he gave it to his mother, who had already had the disease when young.

But the following instances, recorded by Dr. McGregor, most convincingly illustrate the contagious nature of this affection :—

“E. and A. P——, two young ladies, sisters, the former aged ten years, the latter seven, took hoop-cough in London, in January, 1846, during the first stage of which they were sent to school in the suburbs. Two other young ladies, R. M—— and A. G——, returned to the same school at the same time, perfectly free from cough, but, in about ten days, exhibited the usual symptoms, which terminated in the second stage, the peculiar phenomena of which serve to designate the disease. At this period, every child in the school, who previously had it not, took it; clearly proving that contagious and not epidemic influence was in operation. At the end of six weeks from the beginning of the first stage, and a month after the hoop commenced, M. M——, aged seven years, who had never had the disease, with two other children similarly circumstanced, came to school, but not one of them took it, the poison being

exhausted, thus proving the very limited nature of its existence.”*

Dr. McGregor thinks, on the average, about two months appear to form the limit of its contagious properties, after which there is little or no danger. Cullen, and many others, believe it disappears in from four to six weeks; but this is in reality a matter of some difficulty to determine positively. Dr. Copland says the infectious property seems to diminish as the disease declines; Aberle, on the contrary, observes that the time when its contagious character is in its highest intensity, appears to be when the patient is recovering. I am inclined to agree with Aberle, because, so far as my own experience goes, I have seen instances where the disease has been particularly contracted, on the first exposure to contact, when the child has been on the verge of convalescence. I quite agree with Dr. West, that so long as the child continues to cough at all, even though only once or twice a-day, we should be unwilling to restore him to the society of children who have not already had the disease.

Guersent, and others, relate that it is often necessary to infection to inhale the breath of the affected child, and the disease should be fully developed at the time.

Dr. West thinks that infants under six months

* *Lancet*, vol. ii. p. 146, 1846.

old appear to be especially indisposed to receive it, either by association with other children, or as the result of atmospheric influence. If carefully kept from contact with other children, infants of tender age will very often escape during the general prevalence of the disease ; and in nearly half of the cases that he had met with in infants under six months old, other children in the family had suffered from it for a week or ten days before the infants showed any sign of it.

The latest period of its miasm or sanguineous toxication previous to declaring itself, is not ascertained. Dr. Gregory thinks it must be about eight or ten days ; Guersent, ordinarily, five or six days. Copland says it is generally from five to seven or nine days, or even longer, after exposure to infection that the cough commences.

The question of the undoubted contagious nature of pertussis has been settled by every recent writer of authority in the affirmative, and among these may be mentioned Cullen, Sims, Hillary, Watt, Hamilton, Underwood, Dewees, Gregory, Eberle, Stewart, Johnson, Copland, Roe, Guersent, Blache, Barrier, Duges, Thomas Watson, Von dem Busch, Aberle, McGregor, Ogier Ward, Churchill, West, Todd, &c.

On the other hand, Desruelles, Laennec, Billard, Gardien, Wendt, Stoll, Ozanam, and some others, either absolutely deny its contagious nature, or

doubt it altogether, while some of these maintain its epidemic character.

The settlement of such a question becomes of importance in relation to the prophylaxis.

That it reigns also as an *epidemic* we have fearful instances on record, as many passages in the present work will show. It may be more severe and fatal at one time than another, influenced by climate and season ; or it may be terribly severe at its commencement, carrying off large numbers, and become quite mild and tractable towards its decline, imitating in this respect many other forms of epidemic disease.

Dr. West says, that the outbreak of an epidemic of hooping-cough, though little influenced by the season of the year, seldom, if ever, takes place suddenly, and altogether without warning. Sometimes it succeeds to an epidemic of measles, but still more frequently it follows an unusual prevalence of catarrh, which gradually assumes a paroxysmal character, and puts on the characters of hooping-cough. In a similar way, epidemic hooping-cough sometimes resolves itself into simple catarrh ; the signs of disturbance of the nervous system by degrees disappearing, and the cases presenting the indications of mere bronchial irritation.

If we refer to almost any work treating upon the disease, we shall meet with numerous instances

of epidemics spreading over extensive districts, or even whole countries.

According to Desruelles, Pasquier mentions an epidemic of this kind in 1411, in Paris, which attacked more than 100,000 people. De Thou and Sennert mention another in the same city in 1510.

The previous chapter affords fruitful evidence of numberless epidemics in various parts of the world, in Europe particularly, which have been described by the authors mentioned.

Partial epidemics, limited generally to a city or town, are of frequent occurrence in our own empire, which must be familiar to all, and now and then we find them spreading over a tract of country more or less extensive.

When considering the complications of whooping-cough, it was shown that very many may arise during the prevalence of epidemics, and may assume more or less uniformity in their nature and character. Of these, convulsions, nervous fevers with delirium, erysipelas, epistaxis, eruptive diseases, intermittent and remittent fevers, or some other form of visceral inflammation, often attacked the patients, and greatly added to the mortality.

Diagnosis.—The well marked hoop and the paroxysmal character of the cough are the principal signs by which it may be readily distinguished from all other diseases. But these must not be

looked for until the catarrhal stage has subsided, although it is possible they may be present from the very onset in some instances. Some writers mention that the hoop is generally absent in adults, and usually, but not constantly, in very young children ; this is true to some extent, and the possibility of its absence cannot be denied, and may influence our diagnosis ; this, however, will not prove difficult if other children or even adults in the same family or assembly of persons are affected at the same time with the genuine form of the disease. In very young infants a common cough is often accompanied by an occasional hoop, if they are at all alarmed at the cough ; this might produce an error in diagnosis, unless caution is observed.

The kink is almost never absent, in fact, the hoop and kinks cannot both be absent, or the disease would not be pertussis ; and the series of convulsive, forcible, and rapid succussions, without intervening respiration, is observed in no other disease to the same extent, except, as Dr. Churchill remarks, asthma, which is not an affection of childhood. The intervals of rest, and the vomiting after the paroxysms, will equally render clear the accuracy of the diagnosis.

If called to a case with complications of the lungs, brain, or other organ, and the hoop has in consequence disappeared for the time, the previous

history will have to determine whether it is or is not pertussis.

Pertussis may be confounded with bronchitis, with spasmodic cough, laryngismus stridulus or spasm of the glottis, croup, tuberculosis of the bronchial glands, and œdema of the glottis.

1. *Bronchitis*.—In Chapter V., the distinctive signs between the two were given from Valleix. The following are from Rilliet and Barthez:—

Pertussis.

Catarrhal stage generally preceding the kink.

The hoop following the kinks, with glairy tenacious expectoration, and almost always vomiting.

Little fever, no hurry of respiration during the intervals, and the inspiratory murmur free.

Kinks continue for a time, then decrease until the cough becomes simple, and child convalescent.

Bronchitis.

Paroxysm of coughing coincident with the commencement of the disease.

Kinks shorter and less intense, no hoop, but little expectoration, and no vomiting.

Fever is intense, respiration hurried and increasing in frequency, râles sibilant and mucus, afterwards subcrepitant.

Smallness of pulse, extreme dyspnœa, paleness of face, persist or increase, and the disease almost always terminates fatally.

2. *Laryngismus Stridulus*.—It is easily distinguished, although there is a great resemblance between the sounds of the hoop and the crowing

inspiration, owing to both resulting from the same mechanical condition of the larynx, viz., more or less perfect closure, terminating in a forcible inspiration. But in spasm of the glottis there is very rarely any accompanying cough, and the spasm occurs quite independently. There is no kink, no expectoration, nor vomiting, nor any catarrhal sounds in the lungs.

3. *Croup*.—In pertussis there is hurry of respiration, but neither the difficulty nor the sibilant sound; the cough, though loud, has not the peculiar metallic sound of croup, and in the intervals there is complete relief, neither hoarseness nor dyspnœa as in croup. In croup, also, there is wheezing, and no intervals of rest, and an absence of many of the important symptoms of pertussis.

4. *Tuberculosis of the Bronchial Glands*.—As the distinctive differences between the two are given at page 115, it will not be necessary to introduce them here.

5. *Œdema of the Glottis*.—The inspiration only is attended with an abnormal sound, arising from the swollen edges of the rima glottidis being forced inwards, obstructing the passage. There is sometimes a strangling cough following the act of swallowing; with the presence of dysphagia and dyspnœa.

Prognosis.—When the disease is simple, the prognosis is favourable. In other words, so long

as it is uncomplicated, free from inflammation of any kind, or fever, unless that attending mild catarrh; possessing the characters of the simple form exclusively, and occurring in a healthy child; whose dentition also has been completed, or who has no determination or irritation of the internal organs; the season of the year being mild and dry, and no recent convalescence from any other infantile affection; it will not prove a dangerous disease. It will, under the most favourable circumstances, however, run a certain course.

Should a second invasion arise, after apparent cure, it may under unfavourable conditions give rise to complications which may prove troublesome. Or, should they arise during the progress of the affection, according to their nature and severity will be the nature of the prognosis. But when it is recollected that these constitute the items in the cause of the frightful number of deaths in all bills of mortality, they must necessarily invest the disease with a serious aspect.

Complications, therefore, of every kind are dangerous, in proportion to the age of the child, in very young children, for instance, in those just weaned or suffering from dentition, or in those again of very delicate health, or naturally unsound constitution.

With a good nurse, a healthy child, under six months old, in whom the intervals are complete

and of some duration, and whose paroxysms are followed by vomiting and free excretion of mucus, combined with rest at night, good appetite and little or no fever, will get through the disease much better and easier than one a few months older, who may present some of the last-mentioned conditions.

Head affections are to be dreaded, particularly in scrofulous children; and in any children during the first dentition. If a frequent and violent cough be present, with hurried respiration, dyspnœa, fever, scanty expectoration, no vomiting, loss of sleep and appetite, and any indication of local complication, the prognosis will be more or less unfavourable.

A preceding attack of some of the exanthemata, as measles or scarlet fever, which favour some form of pulmonary complication, renders the prognosis unfavourable also.

In adults, who possess greater strength of constitution and a lesser liability to the diseases which usually produce a fatal result in pertussis, the prognosis will be favourable. Should there be a plethoric habit of body, there is great danger that the violence of the cough may produce apoplexy; or, if the constitution be debilitated, there is a risk of the occurrence of pneumonia, bronchitis, and pleuritis, which may prove unusually severe; and in young adults, of a scrofulous diathesis, hæmop-

tysis or phthisis may be produced; these will require a cautious or reserved opinion as to the result.

If, however, the disease be present in advanced life, with debility and a want of the ordinary stamina and natural powers of adult age—when osseous deposits have taken place in or have replaced the various cartilaginous structures of the body, the chest and larynx particularly, which now lose their elasticity, and in consequence the concussions of coughing give shocks to the system to which children are scarcely liable, the result will most probably prove serious, the aged patient sinking under the violence of the disease before any organic affection has been produced. Under the most favourable circumstances in old people, this affection will present a more or less serious aspect.

In pregnant females the danger of abortion is increased, and the subsequent condition may require more than ordinary care and prudence in preventing any ulterior complication; the prognosis here must be guarded.

Hysteria may produce an obstinate continuance of the pertussal cough which may baffle treatment, but the prognosis is nevertheless favourable.

If the disease is raging in an epidemic form, it acquires a certain amount of gravity from the sometimes fearful number of complications which

present themselves ; the danger therefore is great ; and even under otherwise favourable circumstances we must here be very cautious in giving our opinion.

All the circumstances just mentioned must be taken into consideration in giving a prognosis, but so long as no serious interruption interferes with the natural progress of the simple affection in the child, we may be warranted in pronouncing favourably as to the result.

CHAPTER XV.

REMEDIES RECOMMENDED BY VARIOUS WRITERS
IN THE TREATMENT OF PERTUSSIS.

ALTHOUGH a host of remedies and various forms of treatment have been recommended at different times for this disease, it would be acting unfairly and unjustly to many physicians of high standing and respectability, and who were the first to originate or discover their use, to exclude them from even a brief consideration here.

In a work specially devoted to the consideration of a particular subject, as this is, those who have contributed to the further elucidation of it should not be neglected, nor merely receive a passing notice. And however foreign it might perhaps appear, at first sight, to introduce other forms of treatment when a particular one is advocated, it nevertheless would be censurable to a great degree to omit them. These shall be considered, therefore, in the present and two following chapters, giving particularly the views of some who first recommended them, and the opinions of others who, after trial, have either confirmed those views or have condemned them. These chapters will also serve for the purpose of reference to those

who may feel desirous of observing at a glance the names of writers who have added to the literature of this branch of the subject.

I have not condemned any of these remedies, even though many of them have not proved so successful in my hands as they appear to have done in others. It requires a large and very extensive hospital experience to pronounce judgment. But when a single remedy has been used by a number, even in private practice, their united testimony proves of value. I should be sorry to build up the reputation of my own remedy by an attempt to promote the downfall of that of another, which so far has been recommended with judgment, and the test of experience as to its value.

In its partial application here, the following may be quoted from Dr. Watt :—"In the present state of our knowledge, it would be absurd to reject a medicine which has the sanction of experience, merely because we cannot see or cannot explain its operation on the human body."

The remedial means which have been recommended for the treatment of hooping-cough are—

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| 1. Venesection. | 6. Change of air, and a regulated temperature. |
| 2. Leeches. | 7. Warm baths. |
| 3. Emetics. | 8. Hydrocyanic acid. |
| 4. Antimonials. | 9. Laurel water. |
| 5. External applications. | |

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| 10. Belladonna. | 27. Hydrochloric acid. |
| 11. Opium and its compounds. | 28. Sulphuric acid. |
| 12. Hemlock. | 29. Nitric acid. |
| 13. Henbane. | 30. Cochineal. |
| 14. Digitalis. | 31. Alum. |
| 15. Tobacco. | 32. Tannin. |
| 16. Arsenic. | 33. Vegetable acids. |
| 17. Silver. | 34. Alkalies. |
| 18. Iron. | 35. Vaccination. |
| 19. Zinc. | 36. Cantharides. |
| 20. Lead. | 37. Musk. |
| 21. Copper. | 38. Assafoetida. |
| 22. Cauterization by Nitrate of Silver. | 39. Meadow Narcissus. |
| 23. Inhalations. | 40. Cup Moss. |
| 24. Coffee. | 41. Castor. |
| 25. Peruvian bark. | 42. Nux vomica. |
| 26. Quinine. | 43. Miscellaneous other remedies. |

The first seven will be considered in the present chapter.

1. *Venesection*.—This was strongly recommended by Sydenham in hooping-cough, who had an exalted notion of its benefits in other diseases. The following extract is from his “Medical Observations on Measles :”—“Let no one wonder that I recommend bleeding with tender infants. As far as I have observed, it is as safe with them as with adults. * * * * * At present, too, I say nothing about the immense relief afforded in the *pertussis*—or the hooping-cough—of infants by

* Sydenham Society's Edition, vol. i.

venesection. Here it leaves far behind it all pectoral remedies whatsoever."

In Swan's edition of his works, he specially remarks: "By this practice of venesection and repeated purges, and by this only, is conquered the convulsive or hooping-cough; an obstinate disorder, which scarcely any other method will subdue."

We shall find many authors who approve of bloodletting in this affection, even to the present time. Willis speaks of it as a very useful remedy. Hoffman, after describing very clearly a malignant epidemic hooping-cough, which prevailed at Berlin in 1709, remarks that when the fever was violent, with great difficulty of breathing, bleeding was highly useful; but, under other circumstances, he dissuades from the use of it, as not only unnecessary but hurtful.*

When the chincough is violent, says Astruc, we should have recourse to bleeding, for though the lungs are not inflamed, the œsophagus, &c. are. A child of eight or nine months old may be bled once; if he exceeds two years, twice.†

Dr. Sims remarks that bleeding was extremely beneficial during the first stage, and the blood when drawn showed much siziness.‡

* Opera, edit. Geneva, 1740, tom. iii.

† Treatise on all the Diseases of Children.

‡ Observations on Epidemical Disorders.

Dr. Lettsom is a strong advocate for bleeding. This disease very rarely appears, he says, without a cough having previously existed for some days or weeks, and hence it will be less necessary to take away blood from infants already weakened ; but there are instances where children of a considerable degree of strength and health have been attacked by the whooping-cough, which hath been early accompanied with fever, hæmorrhage, contractions of the extremities, pains in the breast, hard pulse and bloated face, indicating congestion in the vessels ; under which circumstances, I presume, he says, no reasonable objections can be urged against venesection, proportioned to the strength of the patient and the violence of the symptoms.* He says Dr. Lieutaud recommends it when the fever is high and the breathing laborious ; and he further observes that Willis, Sydenham, Astruc, Huxham, Home, Sauvages, Hillary, Bisset, and other physicians, lay considerable stress upon the advantage of bleeding in this disease.

To a person who is accustomed to consider the uniformity and simplicity of all nature's works, writes Dr. Millar, it may indeed seem inconsistent to recommend large and repeated evacuations in any disease, of which the cure is chiefly to be accomplished by astringent and strengthening

* Med. Memoirs of the London Dispensary.

medicines. He is opposed to bloodletting in whooping-cough.*

If the fever is high when I am first called, and the child of a sanguine habit, I advise bleeding; and if the patient is costive I direct a cooling clyster to be administered, and the body to be kept open by some gentle purgative. This is the method, observes Dr. Armstrong, I have lately adopted for curing this disease.†

In plethoric subjects, or in others when, from the circumstances of the cough and fits, it appears that the blood is with difficult transmitted through the lungs, Dr. Cullen says, bloodletting is a necessary remedy; it may be even necessary to repeat it, especially in the beginning of the disease.‡

Dr. Hillary recommends venesection in the climate of Barbadoes, as not only useful, but in many cases absolutely necessary.§

When the breathing is very difficult and the violence of the cough occasions a blackness of the face and neck, with symptoms of suffocation, it is necessary to take away a little blood, says Mr. Hayes, either from the arm or the application of leeches to the temples. I have known, he remarks, an ounce or two of blood from the nose

* Obser. on Asthma and Whooping-cough, p. 174.

† Diseases most incident to Children.

‡ First Lines of Pract. of Physic.

§ Observ. on Air and Diseases of Barbadoes.

give a critical turn to the disease. The blood being detained in the lungs and the great vessels leading to the head, when the breathing is long suspended by coughing, makes it necessary to bleed in proportion to the age and strength of the patient, and to repeat it if the difficulty be not removed.*

Dr. Watt has devoted not less than sixteen pages to the consideration of bleeding, in his book on Chincough. He remarks that bleeding, in general, is not to be regarded as a regular part of the treatment. It only becomes necessary, he says, on the accession of certain symptoms, and when these are removed, or when there is no longer any hope of their removal, bleeding should be abandoned, of course. The symptoms requiring bleeding are chiefly such as show congestion, increased action, or actual inflammation in the head, chest, or abdomen.

Dr. Mason Good says: "Throughout the first stage our attention should be directed to whatever will moderate the influence of the contagious stimulus, retard the return of the convulsive paroxysms, and mitigate their violence." Bleeding, he says, in severe cases, will be found necessary for this purpose; but it should be avoided except in severe cases, as spasmodic affections are often rather increased than diminished by the use of the lancet; and it will in general be found

* A Serious Address respecting Coughs, &c.

better to employ blisters as a substitute." His remarks are judicious in the choice of cases where this remedy is applicable ; the observations by Dr. Mackintosh will appropriately follow :*—

"Bleeding is not necessary in a great majority of cases, nay, it might prove injurious in some, by interfering with the efforts of the constitution ; but when the patient has fever, difficulty of breathing between the paroxysms, a near approach to asphyxia or convulsions during the paroxysm, or if he complain of a constant sense of stricture in his chest or severe headache, I would recommend bloodletting by opening a vein, if the patient be robust, about two years of age ; and if the air tubes are not filled with mucus, I have frequently seen the best effects from opening the jugular on such occasions. It is impossible to say what quantity should be taken ; it ought to be sufficient to make an impression upon the disease or upon the system. I once saw a boy, six years old, labouring under hooping-cough, who was in great danger from the congested state of his lungs and brain. I requested the gentleman who was in immediate attendance to open a vein and to allow the blood to flow till relief was obtained. At my next visit, I found that fifteen ounces had been abstracted. He bore the bleeding well, and his condition was very much improved. Next day, however, violent ente-

* Pract. of Physic. 3rd Edit. Vol. i. 1832.

ritic symptoms took place, which were not subdued till after the application, in all, of twenty leeches. This boy made a remarkably rapid recovery. It must not be understood that I would recommend the same quantity of blood to be taken from every child of that age; the case is mentioned to show that a considerable quantity may be abstracted without necessarily producing any bad consequences, and its power in controlling the disease.

“A similar practice may be pursued if the patient be lethargic, which, in such cases, marks oppression of the brain, and frequently precedes convulsions.”

Dr. Graves says he quite agrees with Dr. Mackintosh in the treatment he proposes for the first, or catarrhal stage of the disease. The antiphlogistic regimen and treatment, leeches to the larynx, in some cases even general blood-letting, antimonials, and ipecacuanha in nauseating doses, are the remedies which the first stages of hooping-cough almost invariably require.*

In Dr. Elliotson's Lectures, he speaks as follows on the treatment of hooping-cough:—“Now the treatment is divided into the inflammatory and the spasmodic; and, first, for the inflammatory, as by far of the most consequence. If it be found that there is a constant oppression of the breathing, with spasmodic attacks and violent cough at

* Clinical Medicinc. 1843.

times, an accelerated pulse, pyrexia, sonorous, sibilous, and crepitous rattle, it will be evident that there is inflammation of the bronchiæ or of the substance of the lungs, of the tubes, of the air-cells, or of both. In this state you might give antispasmodic narcotics, and yet do no good ; in fact, there is every probability that you would do great mischief. Therefore it is most important to detect any inflammation, and combat it in the usual way. You will bleed generally, if the patient is old enough, but at least locally ; you will give mercury and emetics. Usually you will find these means enough to cause the disease to yield, but you ought at the same time to purge well with calomel, giving it in small and repeated doses.”*

In Dr. Gregory’s chapter on Hooping-cough, there is the following paragraph.† “In all severe cases, when the cough is accompanied with permanent dyspnœa, much heat of skin, and other febrile symptoms, general or local blood-letting ought never to be omitted. It is frequently necessary to repeat the evacuation of blood two or three times before the symptoms yield. When the child complains of much headache, it will be right to apply a few leeches to the head. It has been observed that the severity of the *hoop* has been by this means diminished.”

* Theory and Practice of Medicine, p. 529.

† Elements of Theory and Pract. of Medicine.

In speaking of the treatment of whooping-cough, Dr. Watson says, in his Lectures on the Principles and Practice of Physic :—

“Now, we know that the *bronchi*, or the *lungs*, are affected with inflammation, when we find that the child has *fever*, and that there is *permanent dyspnœa* between the paroxysms of spasmodic cough. In such a case we must have recourse to the treatment required in such inflammation : leeches to the surface of the chest, bleeding even from the arm, if the child’s age and strength should warrant it, tartar emetic, small doses of nitre, the warm bath, and blistering ; and to these measures, modified and combined according to the particular emergency, it will be well to add small and repeated doses of mercury, of the hydrargyrum cum cretâ, or of calomel, the state of the bowels determining which.”

Dr. Fife deprecates depletion by either general or topical abstraction of blood, unless acute inflammation be present.*

2. *Leeches*.—The use of leeches is approved of, and recommended by some, in preference to general blood-letting, as less dangerous, more convenient, and certainly more suitable to very young infants, when there is a proper indication for their use. It has been already shown in some of the remarks upon venesection, that many writers leave the

* Prov. Med. and Surg. Jour. June 16th, 1847.

choice of either of these means of obtaining blood, to the discretion of the physician, according to circumstances, which may require either. Very few observations will be necessary, therefore, under this head. But the use of leeches has been considered by a few as the almost only and sole cure for hooping-cough, combined with other means, which have been looked upon as secondary.

The details of eleven cases have been published in the first volume of the *Medico-Chirurgical and Philosophical Magazine*,* by Dr. Webster, in which the rationale of the cure was explained by removing the affection of the head commonly met with in this complaint (?), and this was done by the application of two or more leeches to the forehead. In addition, small doses of aperient and diaphoretic medicines were given in all but one, which was cured by leeches only; the average in the period of cure was over fifteen days. The ages were 4, 14, 16, 18, and 20 months; and 2, 4, 6, 6, 7, and 9 years.

Dr. Thomas remarks,† when the disease takes place in a child of a full, plethoric habit, and is accompanied with a difficulty of breathing, full pulse, and other febrile symptoms, it may probably be attended with advantage to take away a small quantity of blood, and this will be done best by

* Page 90, *et seq.* 1823.

† Practice of Physic.

applying a sufficient number of leeches either to the neck or chest; which operation may be repeated after a time, if the degree of dyspnœa is not lessened; but in common cases, where no such symptoms prevail, bleeding of any kind will not be necessary.

The observations of Dr. Mackintosh on venesection have been already given, but he says with respect to leeches:—"We must depend upon them in young children, as well as in older patients, in advanced stages of the disease; the number of leeches to be regulated according to the circumstances noticed when treating of bronchitis. To show the advantage of leeching, even at the eleventh hour, he refers his readers to three cases mentioned in Willan's Diseases of London.

Mr. Whatton, of Manchester, in a paper on the Pathology and Treatment of Hooping-cough,* recommends leeches over the larynx or back of the neck to remove congestion, or even between the shoulders. Aperient medicines, tartar emetic, pediluvia, James' powder at night, and venesection, if necessary, in the acute form of the disease.

Dr. Crisp recommends the antiphlogistic treatment in the early stages. In robust and healthy children the application of leeches, followed by blisters, and the use of tartar emetic, has in his hands been attended by the best results. He views

* *Lancet*, vol. ii., 1830-31.

the disease as inflammatory, or, at all events, congestive.*

Dr. Ogier Ward approves of depletion by leeches when the features are puffy, the eyes bloodshot, and there is general oppression, with mucous râles in the lungs: they relieve the congestion and mitigate the paroxysms when applied to the head and chest. Of the two modes, when both are affected, he has found most benefit from their application to the head.†

Hufeland directed leeches to the chest. Dr. Copland has seldom omitted to apply them behind the ears, or between the nape and occiput, or to prescribe *cupping* in this situation at an early stage.

The pathological treatment of Dr. Pidduck consists in applying leeches directly over the junction of the occiput and the atlas vertebra, for the purpose of relieving the congested state of the vessels at the origin of the pneumogastric and other respiratory nerves, followed by a blister between the shoulders, to promote their contraction. The rubefacient effect of the blister is sufficient to answer this indication, and therefore, in delicate children, a mustard poultice is preferable to a blister. The rule to be observed, he says, is to apply one leech for each year of the child's age,

* Lanect, vol. i., 1845, p. 137.

† Prov. Med. and Surg. Jour., Oct. 20th, 1847.

from one to six ; and immediately after the leeches, the small blister or sinapism ; and to repeat the leeches and rubefacient on the third or fourth day, if necessary. This mode of treatment applies strictly to the uncomplicated form, and Dr. Pidduck observes that during the period of nearly thirty years that he had pursued this rational practice, he cannot recollect a single instance of failure in uncomplicated whooping-cough.*

3. *Emetics*.—The modern writers, Willis, Astruc, Cullen, Bisset, Navier, Amstein, Hamilton, Burns, Armstrong, Watt, and others, have approved of the use of emetics freely ; some, at every period of the disease. Dr. Roe believes emetics not only useless, but absolutely injurious, in the early stage of the complaint. When the respiration becomes short and rapid from accumulated mucus in the bronchiæ, he says they are then the most useful of remedies. They have been found the most useful of all remedies by Dr. Thomas. Emetics have been much over-rated, Mackintosh writes. One or two may be of use when the disease is forming ; and they may be exhibited now and then in the latter stage when the expectoration is not easy. There is hardly a case, says Dr. Elliotson, that will not be benefited by the continued use of them ; indeed, a large number of cases may be trusted to them, and to narcotics. Dr. Gregory remarks that

* Lancet, vol. i., 1849, p. 640.

frequent emetics, from their tendency to weaken the stomach, are inadmissible : but a few grains of ipecacuanha with chalk may occasionally be given. At the Infirmary for Children, Dr. Willshire has treated simple uncomplicated hooping-cough with two or three emetics of ipecacuanha, one every morning or second morning, followed for two or three days with nauseating doses of antimony, and had found this plan of great service in the early stages. Hemlock and ipecacuanha were serviceable afterwards in relieving the cough.* Dr. Eberle recommends emetics from time to time with advantage in any stage of the disease, but thinks their *frequent* repetition will debilitate the system, and derange the stomach.

Dr. Churchill recommends a gentle antimonial emetic in the first stage, followed by an expectorant every four or six hours, the former to be repeated occasionally.

Dr. Fife has found full emetics repeatedly given, aided by alkalies and cochineal, most efficacious in the simple form of the disease. He has preferred ipecacuanha alone, or in combination with the sulphate of zinc in small doses, to antimonials. He combines with emetics, sedatives, such as hydrocyanic acid and tincture of hyoscyamus.† Dr. Ogier Ward has found emetics and sedatives, with

* *Lancet*, vol. i., 1845, p. 137.

† *Prov. Med. and Surg. Jour.*, June 16th, 1847.

an occasional mild mercurial, to correct any disordered secretions, quite sufficient to carry the patient through the disease with comfort and safety.*

Dr. Copland says experience has proved them to be most serviceable in this complaint, when judiciously employed.

The following is the method adopted by Valleix, in a case of simple pertussis:—1. A simple *tisane*. 2. An emetic mixture of tartarized antimony, syrup of ipecacuanha, and infusion of violets, to be taken by spoonfuls till the child has vomited two or three times. 3. Belladonna ointment, one drachm of the extract to four drachms of the cerate, to be rubbed night and morning over the epigastrium. 4. Diachylon plaster, to be applied to the walls of the thorax, if painful.

4. *Antimonials*.—Fothergill† recommended the following prescription in 1767:—Take of powdered crabs-claws half a drachm; tartar emetic two grains; to be well mixed, and one or two grains to be given to a child a year old, between breakfast and dinner. This was a favourite remedy for a great number of years, and is recommended at the present time by Maunsell and Evanson, and others. Dr. Von Iffland, of Quebec, speaks very highly of

* Prov. Med. and Surg. Jour., Oct. 20th, 1847.

† Med. Obser. and Inq., 3 vols.

this prescription, in a paper on Hooping-cough,* and has frequently employed it with marked success. Schlesinger combined the extract of hemlock with tartar emetic beneficially. Tartar emetic was also employed by Hirschel. The golden sulphuret of antimony, or Kermes' mineral, was used by Closius and Hannes. Van de Sande and Unzer gave it after emetics, and Holdefreund conjoined it with sugar of milk. De Haen describes the success he met with from the use of Kermes' mineral as most astonishing. Quarin gave it with the flour of sulphur, gum arabic, and extract of liquorice. Henning and Keutsch gave ipecacuanha in small doses combined with antimony.

Dr. Watson says :—"There is a method recommended many years ago by a namesake of mine, which some people swear by. Sir William Watson's prescription was one grain of tartarized antimony and twenty drops of laudanum in an ounce of water. A teaspoonful or a dessert-spoonful of that mixture was given every evening or every other evening. I have heard the late Dr. Gooch say that his mother became famous as a village doctress by the help of that prescription." I have frequently found small doses of tartar emetic, combined with other remedies, very beneficial in certain complications of the disease.

* Montreal Med. Gaz., 1844, vol. i.

5. *External Applications.* — *Tartar emetic ointment* was recommended by Autenrieth for whooping-cough many years ago, and was long known under the name of “pommade d’Autenrieth,” and is most strongly recommended by many writers of authority. It is composed of a drachm and a half of tartar emetic and an ounce of lard. His treatment consisted exclusively of frictions of this ointment to the chest. In an epidemic which prevailed during the year 1830, Dr. Luroth treated thirty-eight patients, between one and four years old, with this ointment; four patients died; and thirty-four were cured within periods, the average of which was twelve days. Autenrieth considered this a certain specific, when a copious crop of pustules is produced on the epigastric region. Dr. Mackintosh has seen it very serviceable in this disease, so much so, that he always had recourse to it. He says it is preferable to blisters because it is more permanent; he has observed many peculiar effects from the use of it.

Dr. Graves never derived any advantage from its use, either over the stomach or the spine. Barrier does not approve of it. *Tartar emetic and cantharides*, one scruple of the former dissolved in two ounces of water, and one ounce of tincture of cantharides added, was prescribed as a liniment by Dr. Streuve, of Gorlitz, about 1798, in whooping-cough; this rubbed in every two

hours, over the stomach, produced the best results.* Dr. Gregory recommends a similar liniment, but the antimony is doubled in quantity, and advises the rubbing along the course of the spine as well as the chest. *Tartar emetic solution.* Dr. Von Iffland, of Quebec, uses a solution of a drachm of tartar emetic in an ounce of water (recommended by Dr. Leon Rousseau, of the same city), to be rubbed actively upon the neck until small pustules are formed. They are less painful, and better suited to young children and infants.†

Embrocations and Liniments.—Roche's embrocation has long been and still is a favourite remedy with mothers. This (Dr. Paris tells us) consists of olive oil, mixed with half its quantity of oil of cloves and oil of amber. Dr. Copland recommends a liniment of camphor, turpentine, tincture of capsicum, and oil of cajeput, to be rubbed on the chest twice a-day. Dr. Churchill, compound camphor liniment and laudanum, two ounces of the former to two drachms of the latter, rubbed into the chest and back, alternately morning and evening. Dr. Hamilton seems to approve of *garlic* to the soles of the feet; and a popular use of it is to steep it in brandy and rub the spine. A poultice containing scraped *horseradish* is re-

* Med. and Phys. Jour., vol. i.

† Montreal Med. Gaz., vol. i., 1844.

commended by Henning; and the tincture of *ginger* to the epigastrium by Zadig. Löbenstein Löbel advises a liniment containing a solution of *phosphorus* in oil of cummin and camphor, to be rubbed over the epigastric region. Rubbing the spine with rectified oil of amber, or of soap liniment and oil of amber, or of garlic ointment, are said to be useful in lessening the cough. Dr. Little and M. Blache have used frictions of turpentine. Dr. Fife, soap liniment, with opium or camphorated oil, to the spine. *Blisters* have been used by Willis, Dr. Watt, Cullen, and others. Dr. William J. Waller, of Virginia, used a single blister to the nuchæ in six most severe cases of hooping-cough. All recovered rapidly, and without a vestige of cough remaining.* Dr. Meyer, of Minden, applies morphine to a blistered surface every evening, over the epigastrium, first removing the epidermis. The morphine, half a grain, is triturated with starch. He relates five cases cured in eight days, without any other remedies.† M. Brendt has been equally successful with it. If necessary, the blister should be removed every third day. Dr. Bow recommends the external use of narcotics, but it is a dangerous plan. Of sixteen cases treated by Professor Brendt, no less than six

* Stethoscope and Virginia Med. Gaz., vol. ii., 1852.

† Amer. Jour. Med. Science, vol. v., and Archives Générale, Oct. 1829.

exhibited symptoms of narcotism from opium and morphine.* Mr. Warren says that liquid laudanum rubbed all over the abdomen and pit of the stomach twice a day gives great relief. Dr. Copland speaks very highly of the mustard foot or hip bath, and dry cupping on the nape of the neck or between the shoulders.

6. *Change of Air and a Regulated Temperature.*—Pure air, says Mr. Hayes, is of the greatest importance in whooping-cough. It is necessary in all its stages. The air of large towns and populous places always aggravates the disease. Dr. Watt has met with many severe cases that got better every hour as the patients proceeded on their journey in the open air, scarcely a cough occurring, and the fever going away. Dr. Ferriar thinks the beneficial effects of the limestone soil of Derbyshire have long been known to the old practitioners of Manchester in the cure of whooping-cough. He has frequently verified this in some striking instances.† Dr. Thomas advises a change of air. Dr. Armstrong recommends a bland diet, a regulated temperature, 58° to 64°, and mild aperient medicine.‡ Dr. Merriman remarks, “I am not acquainted with many, if with any, instances in which the force of

* Lancet, vol. ii., 1837-38.

† Med. His. and Reflec., Review of, in Ed. Med. Jour., vol. vii.

‡ Lectures in Lancet, 1826.

the disease has been abated by change of air. I should not recommend it for this purpose, but I have often witnessed its usefulness in shortening the stay of the distemper after its force was abated.”*

M. Sandras says, that one of the surest therapeutic means against hooping-cough is change of air and place of habitation. It is the first thing he recommends, and considers himself authorized to do so from experience.† Dr. Mackintosh observes that change of air is often productive of great mischief, by occasioning a return of the disease. He remarked, in a severe epidemic, that all the children which were moved for change of air had the disease longest. Dr. Elliotson repeats that one of the best things is change of air.—“ Every old woman says so, and I believe they are perfectly right. I have known, and so must every one, cases which obstinately resisted all treatment cease after a change of residence. You will not find this at the beginning of the disease; it is only after it has existed for some time.” When the disease proves very tedious and obstinate, and has rooted itself in the system by force of habit, Dr. Gregory writes, change of air will be found eminently beneficial. The late Dr. Beatty made it a rule to keep his patients confined to their bed-

* Underwood on Dis. of Chil. p. 428.—*Note.*

† *Bul. Thérapeutique*, 1833.

room until the cure was completed. Dr. Graves believes that the recovery of the patient, in the great majority of cases, is accelerated by this means. Dr. Chowne lays particular stress on the necessity of keeping the patient in a warm temperature, and using every means to prevent his catching cold.* Mr. M'Veagh, of Dublin, says that one of the most frequent, and at the same time the most fallacious and injurious, ideas is, that change of air is of material benefit to the patient. He confines his patient to his bedroom the entire time, or to a well-aired room contiguous to it.† Dr. M'Gregor enjoins a strict confinement to the house, and, if possible, to one room, except during the summer months.‡ Dr. Copland remarks that for patients residing on the sea-coast, *frequent excursions* on the water will be highly beneficial, especially if nausea or vomiting be thereby produced.

Dr. Churchill approves of an occasional walk or drive on fine days, and during the warm parts of the day; and a change from town to country, when the cough is fairly on the decline.

I have observed the worst effects, followed by dreadfully severe attacks of coughing, from out-door exercise in the winter season in Canada, and this

* Lancet, vol. i. 1845, p. 137.

† Ibid. vol. i. 1848, p. 336.

‡ Lancet, already quoted.

particularly in cases of dispensary practice. I have frequently prescribed change of air and residence in the warm summer season, with the greatest advantage, at different periods of the complaint, when free from complications. An absence in the country for a single day in summer I have known to completely cure a child of this disease.

7. *Warm Baths* are recommended with other treatment by many French writers, among others Blache, Guersent, and Barrier. While in the bath, the hooping, which was incessant before it, immediately ceases. Dr. Elliotson says a cold shower bath is useful after a time. Dr. Copland recommends salt-water bathing, commencing with the warm or tepid bath, and passing gradually to the cold or shower bath, as very serviceable, if no complication forbids it.

CHAPTER XVI.

CONTINUATION OF THE REMEDIES RECOMMENDED.

8. *Hydrocyanic Acid*.—This remedy was first recommended in England by Dr. Granville in 1819, in a book entitled, "Further Observations on Prussic Acid in the Cure of several Diseases, &c." He had however, previously to that date, published a paper on the internal use of prussic acid in the Monthly Medical Repository. The "Pharmacopœia Pauperum," for the Royal Metropolitan Infirmary of Sick Children, by Dr. Granville, and published in 1820, contains two *formulæ* for the administration of prussic acid, which Dr. Granville says* (Oct. 1838) have been used in the treatment of hooping-cough at that institution since 1820 in some thousands of cases.

On the Continent it had been used by M. Fontaneilles in hooping-cough, and subsequently by M. Coullon in 1808, and since by Heineken, Behr, Kahleiss in 1827 and 1829, Muhrbeck in 1829, and others. Fontaneilles states that he has cured four children in the same family in a few days by this remedy. Muhrbeck, of Demmin,

* Lancet, vol. i. 1838, p. 115.

recommends, in Rust's Magazine, this acid as a specific in the second stage of whooping-cough, or when the breathing becomes difficult and the cough convulsive.*

It has been given successfully in the United States of America by Drs. Edwin Atlee, Stewart, Condie, and others. In Canada, also, I believe it has been employed, on the recommendation of American writers. Dr. Edwin Atlee first used it in 1824, on his own child, aged eleven months, and gave a teaspoonful, morning and evening, of a mixture composed of two ounces of simple syrup and four drops of prussic acid. The second day the same quantity was taken three times a day, and so continued for one week, when she was entirely well. This decided success encouraged him to persevere in his experiments; and from that year till March, 1832, he says he had treated more than *two hundred* patients in this manner. He had never failed, and the cure had always been completed in from four to ten days, or at furthest a fortnight.†

Dr. Hamilton Roe, who has prominently brought forward the use of prussic acid in his excellent Treatise on Whooping-cough, observes at page 89 :—
 “The dose of hydrocyanic acid for an infant is about three-quarters of a minim, of Scheele's

* Amer. Jour. Med. Sci. vol. vii. p. 242.

† Ibid. vol. x. p. 128.

strength, gradually increased to a minim, which may be given every fourth hour; for a child of three years of age, about one minim, gradually increased, if necessary, to a minim and a half, every fourth hour; for children of ten or twelve years of age, a minim and a half, increased to two minims, every fourth hour. It is safer to give this medicine in small doses at very short intervals, than to run any risk of producing too great depression by a large dose. The frequency of its exhibition must depend upon the strength of the patient and the severity of the attack. The dose should be repeated when the effects begin to subside, which, in mild cases, generally happens in three or four hours; but when much fever is present, its influence is felt but a very short time: under such circumstances, a larger quantity may be given, and at shorter intervals, without any apprehension of danger, *so long as the fever lasts*. In some very severe cases, when the pulse was up to 120, with a good deal of fever and a very hot skin, I have given to a girl of ten years of age a minim and a half of this medicine every quarter of an hour for twelve hours; at the end of twenty-four hours she was free from fever, and her strength was not in the least reduced by the effects of the remedy. As some catarrhal symptoms are generally present, a few drops of ipecacuanha or antimonial wine may be advantageously combined

with the hydrocyanic acid ; but the latter alone possesses the power of curing this formidable complaint.” Dr. Roe says he is convinced, from the result of all the trials he has made, that this drug will cure almost any case of simple hooping-cough in a short time ; that in all seasons it will abridge its duration ; and in almost every instance, when it does not cure, that it will, at least, materially relieve the severity of the cough.

Dr. Elliotson says much good, however, may be done, with respect to the spasmodic part of the affection, by good management—giving light food, and a very moderate exhibition of narcotics, but above all, prussic acid: its exhibition is not *very* satisfactory, though he is persuaded it is more so than that of any other narcotic. It does not subdue inflammation, but it alleviates the cough.*

Dr. George Augustus Rees has not met with the same relief from the use of prussic acid as Dr. Roe has, but he believes much of the severity may be mitigated, and the duration of the hooping-cough limited by this acid.† Dr. Crisp has found the use of prussic acid of service only for a day or two.‡ Aberle entirely disapproves of this remedy in hooping-cough, both from its dangerous powers and the great uncertainty of its operation. Dr. Watson, in his Lectures, says prussic acid and bella-

* Lecture on Prac. of Physic.

† Diseases of Children. ‡ Lanct, vol. i. 1845.

donna are gigantic remedies to employ upon such young subjects, and, if given at all, should be given in very small quantities, and their effects watched.

Professor Bedford, of New York, says it will be found useful to administer one drop of hydrocyanic acid in a teaspoonful of sweetened water, when the hoop is severe. If however, not soon efficacious, it must be discontinued.*

Dr. Churchill has tried both the laurel water and the acid repeatedly, and certainly with great benefit, though the acid failed in many cases to shorten the disease. He recommends this medicine to be given in draughts, and not in mixture, because then only can we be quite sure that the child will not get an overdose. He has found almond milk an excellent vehicle.

Dr. West recommends this acid in the second stage, when the paroxysms are well marked and frequent, in the dose of half a minim every six hours for a child nine months old (L. P.); gradually increasing it to one minim every four hours; and so on in proportion for other children. He says this remedy sometimes exerts an almost magical influence on the cough, diminishing the frequency and severity of its paroxysms almost immediately; while in other cases it seems perfectly inert; and again, in others, without at all

* Nelson's Northern Lancet, 1851, vol. iii.

diminishing the severity of the cough, it exerts its peculiar poisonous action on the system, so as to render its discontinuance advisable.

9. *Laurel Water*, distilled from the common laurel, thickened and not filtered, has produced the best results during the convulsive period, in the hands of M. Carron du Villard, in doses of six drops every two hours, and of half a drachm to adults.* M. Jøerg, of Leipsic, accuses it of increasing the cough. Dr. Krimer, of Halle, and Dr. Brofferio recommend the inhalation of its vapour; a drachm should be used at each fumigation, which ought to occupy five, ten, or fifteen minutes.

Out of 122 children under the care of Dr. Pavesi, at Candie, in 1850, he treated 19 by fumigations with cherry-laurel water. The majority of them were strong, and were severely attacked. They were treated in the manner recommended by M. Brofferio, with whom this plan of treatment originated—namely, the head was held some feet above a heated vessel, into which two tablespoonfuls of distilled laurel water were poured, the mouth being kept open to receive the vapour. These fumigations were repeated every two hours. Relief was quickly obtained, the paroxysms were mitigated, and disappeared almost entirely at night, while they became less frequent and less fatiguing by day. However, the disease was not shortened

* Dict. de Méd. ou Répert. Gén. des Sci. Méd. p. 38.

in duration, nor did Signor Pavesi ever see it terminate between the sixth and fourteenth day, as M. Brofferio has stated, notwithstanding the pains which he took to remove all external and internal causes capable of prolonging or aggravating the symptoms. One child only was lost from hæmoptysis, during a fit of coughing.*

10. *Belladonna*.—This remedy was first used in whooping-cough about the year 1783, by Dr. Buckhaave, of Copenhagen, who gave the powdered root in doses of two grains, morning and evening, to a child of five or six years of age, and a cure was generally accomplished in from seven to fourteen days.†

Hufeland, Jackson, Guersent, Blache, Meglin, Stewart, Condie, and others, speak highly of it. Mr. Blackett has employed the tincture frequently in pertussis and other diseases, with decided efficacy, in doses of two or three minims in the day.‡ Schaeffer and Widemann gave it in large doses, and considered that it was quite a specific, particularly when administered in enemata.

M. Blaud places more confidence in the powdered root, and the sulphuret of potass than any other remedies.§ He was chief physician to the Asylum

* Ranking's Abstract, vol. xiv.

† Dr. Duncan's Med. Commentaries for 1793.

‡ Med. Chir. and Phil. Mag. vol. i. p. 300.

§ *Révue Médicale* and *Lancet*, vol. ii. 1830-31.

of Beaucaire, and was a witness to an extensive epidemic. Dr. Sigmond says, neither opium nor hyoscyamus will so completely control whooping-cough as belladonna; but the disease must be purely in the spasmodic stage, it is not efficacious in either the inflammatory or catarrhal.*

Hufeland gave it in doses of a quarter of a grain, morning and evening, to children between three and six years of age.

Dr. Jackson advises that one sixth of a grain should be given to a child three months old every three hours; to a child two years old one grain; and to a child of four years a grain and a half in each dose. Jackson, Guersent, and Blache recommend its continuance until the effect upon the pupil is evident; it may then be discontinued. Barrier has frequently witnessed in certain children a very bright general redness over the body, resembling a confluent scarlatina, as resulting from the use of belladonna.†

Kahleiss gave the powdered root in combination with Dover's powder, sulphur, and sugar, and between each dose a mixture containing prussic acid. He used this up to 1827, in 100 cases, with the greatest success; and since that time he has published a second memoir, in which he reports a great

* Lectures on Mat. Med. in *Lancet*, vols. i. and ii. 1836, 1837.

† *Maladies de l'Enfance*, vol. i. p. 153.

number of cases, which confirm his first results.* Dr. William W. Volk, of Providence, Rhode Island, treated his child, seven months old, with belladonna and prussic acid, as recommended by Dr. Kahleiss, but in smaller doses, and cured it in three days.† Dr. Miquel, of Neverhaus, has constantly cured the cough in eight days, in the course of the many epidemics which have appeared during fifteen years.‡

M. Trousseau combines it with opium and valerian. Guersent recommends equal parts of henbane, belladonna, and oxide of zinc; of the latter he gives one grain every hour to a child six months old.

Dr. Williams has used belladonna with great relief in his practice. He gives it in quarter-grain doses to a child of two years, increasing the dose to double that quantity or more, when it fails to relieve. He remarks that these doses in general cause some dilatation of the pupil, and conceives that the remedial agency of the drug depends on the same power to diminish irritability of the bronchial and laryngeal muscles, which is here evinced with regard to the iris.§

* Archives Générales, Nov. 29th, in 6th vol. Amer. Jour. Med. Sciences.

† Vol. vii. Amer. Jour. Med. Sciences, p. 413.

‡ Ibid. p. 524.

§ Medical Gazette, Feb. 1838.

Dr. George A. Rees has found this one of the most efficacious remedies, but thinks the dose should be even less than that recommended by Dr. Williams. In one of his cases cephalic symptoms came on immediately after the administration of only one quarter of a grain.*

Dr. Waller cured two cases with the twelfth of a grain of the extract, three times a day; one child was four years of age. Prussic acid and conium had failed in affording any permanent relief.†

Dr. Theophilus Thomson has found, in some cases where belladonna was given, that the poisonous, rather than the curative, effects of that remedy developed themselves, even though the doses administered were remarkably small.‡

Dr. Willshire was fearful of its employment, for, notwithstanding the evidence in its favour adduced by certain German practitioners, there were others who had found that this medicine has a tendency to increase vascular action in the brain, and to the production of hydrocephalus.§

Aberle assigns the highest place among narcotics to belladonna: in the convulsive stage much benefit was derived from doses of one twelfth to one half of a grain of the powdered root thrice in the day. The combination recommended by Kopp,

* Dis. of Children, 2nd edit. 1844.

† Lancet, vol. i. 1845, p. 137.

‡ Ibid. § Ibid.

of small doses of this drug with ipecacuanha and sulphur, was found to be of service.*

Dr. Roe observes: "I cannot say that I feel much confidence in belladonna; it is very inferior to other remedies." Maunsell and Evanson have found belladonna useful, in doses of an eighth of a grain three or four times daily.

Pereira† thinks its occasional efficacy depends in part, probably, on its lessening the necessity of respiration (Laennec), as well as on its power of obviating spasm of the bronchial tubes, and of decreasing the susceptibility of the bronchial membrane to the influence of the exciting causes of the paroxysms.

Dr. Churchill says that this is perhaps the most influential narcotic and sedative we possess; it has been very extensively employed, and the evidence in its favour is very strong. As it is very powerful and somewhat uncertain, we should begin with small doses and watch it very closely. From one quarter of a grain to one grain of the powdered root, and from one eighth to one half a grain of the extract, are the doses he recommends to be given two or three times a day.‡

Belladonna has been eminently useful in the epidemics of whooping-cough, which M. Debreyne

* De Tussis Convulsiva.

† Elements of Mat. Med. 2nd edit.

‡ Diseases of Children.

has observed ; but the success attending its administration depends on the observance of the following rules : The dose should be proportioned to the number of months representing the child's age ; and the quantity to be taken in twelve days (the ordinary duration of treatment) will be five centigrammes ($\frac{3}{4}$ of an English grain) multiplied by the number of months. Thus, for an infant six months old, the dose will be thirty centigrammes ($4\frac{1}{2}$ grains) in twelve days ; for one of two years and a half, the dose will be $1\frac{1}{2}$ gramme (23 grains) in the same period. For children above six years of age, the quantity of three grammes ($46\frac{1}{3}$ grains) is not exceeded. The medicine is always given three times in the day. For instance, the prescription for a child three years old would be—powder of the root of belladonna, two grammes ; to be divided equally into twelve powders, of which one is to be given daily, in three divided doses. If there be vomiting, it should be given immediately after a fit of vomiting or coughing. Recourse should not be had to this remedy until the inflammatory element has been overcome by leeches, emetics, &c. ; in other words, it is not to be employed before the tenth or fifteenth day, when the cough will have assumed its specific character.*

11. *Opium and its Compounds*.—Dr. Cullen

* London Jour. of Med., April, 1850 ; and Braithwaite's Retrospect, vol. xxi.

considered opium the most powerful of antispasmodics ; it has proved useful in moderating the cough, if there is no fever or dyspnœa present. Dr. Pearson recommended, for a child two years old one drop of tincture of opium, five drops of ipecacuanha wine, and two grains of prepared natron, repeated every fourth hour for several days.* When the disease has lasted for some time you will find opium useful in a small quantity, observes Dr. Elliotson ; Dover's powder is one of the best forms. Small doses of opium, combined with antimony, Dr. Roe says, very often quiet the cough, when in the early stage of the disease it is hard and dry, with easy and natural respiration ; but if any symptom of inflammation of the lungs or brain be present, the use of it is contra-indicated. It is a medicine, of all others, he observes, which requires to be given with the greatest caution. M. Brachet says that anodyne remedies of every variety have been used in whooping-cough, and none have proved more powerless than opium in the hands of those who have endeavoured to find something more advantageous. Barrier concurs with Brachet in the above opinion, which he says is confirmed by the results of his own experience. Dr. Dewees recommends a combination of pectoric, antimonial wine, liquorice, gum arabic, and water, as a mixture, and its value is corroborated

* Trans. Med. Chir. Soc. of London, vol. i.

by Dr. Churchill. Lombard recommends the syrup of white poppies; Condie the watery extract of opium; and others Dover's powder. There is no reason, however, Dr. Churchill says, for supposing that opium will cure the disease, but it renders the paroxysms less severe, and composes the patient.

12. *Hemlock* or *Conium* was first proposed as a remedy in whooping-cough by Dr. Butter, in 1773. In his indications of cure, he says there is only *one*, namely, to give hemlock! Storck subsequently eulogised its use. Schneider has used it. Dr. Elliotson speaks of its use in small doses, in mixtures or emulsions. Guersent recommends it as the best of all the sedatives, combined with equal parts of belladonna and oxide of zinc. Bang used the cicuta after the exhibition of emetics, during the epidemic at Copenhagen, in 1784, but with temporary advantage only. Dr. Armstrong tried it in 357 cases, of whom seventeen died, but nine of these, he says, were unfavourable cases.* Dr. Roe has found it very useful in cutting short the cough, in doses of a grain of the extract with five drops of ipecacuanha wine every fourth hour.

M. Spencler relates five cases, wherein he gave *concein* with such success as to give it a decided preference over digitaline, tannin, and other remedies. *Case 1.*—Boy, aged seven, relieved, but died from pericarditis. *Case 2.*—Child, four

* On Diseases of Children, p. 142.

months old, dose one-fortieth of a grain, in orange-peel water, three times a day. Cured in eight days. *Case 3.*—Child, six weeks old ; very severe case, same dose. Cured in eight days. *Case 4.*—Child, three years old, dose one-twentieth of a grain, *ter die*, increased to one-tenth of a grain on the fourth day. Cured in eight days. *Case 5.*—Child, a year old, dose one-sixteenth of a grain once in six hours. Cured in ten days.*

13. *Henbane* has been extensively used as a narcotic, in combination with ipecacuanha and other medicines, by Wolff, Wigand, and Joerdens, and is mentioned by almost every writer. Aberle says the extract seems to have done good in some mild cases, but it cannot be relied on. Dr. Copland says it is nearly as beneficial as conium, but in some patients is more liable to affect the head.

14. *Digitalis* has been mentioned by Drake, Darwin, and a number of authors ; but, as Dr. Watson justly remarks, it is a hazardous remedy. Digitaline has been given for the same complaint.

15. *Tobacco.*—The extract of this substance has been recommended by Stoll, Gesner, Hufeland, and Thilenius : the tincture, in doses of one to eight drops, every two, three, four, or five hours, by a writer in the *Lancet*.†

* Nelson's Northern Lancet, 1852, vol. vi., from the Allgemeine Med. Zeitung.

† Vol. ii., 1829-30, p. 509.

16. *Arsenic* is not altogether a remedy of recent date, for we find that Galen and most of the ancient authorities made use of inhalations of the fumes of yellow and red orpiment, for the cure of coughs. Avicenna approved of arsenic, both in pills and solution, for asthma. Platerius, a writer of the thirteenth century, recommended fumigations of arsenic in chronic coughs. If the fact can be established that whooping-cough was known to the ancients, we can then entertain the probability of their having used arsenic for its relief.

The first modern author who recommended this drug as a remedy in whooping-cough, was Mr. William Simmons, of Manchester, who gives a report of its employment in a letter to Dr. Duncan, published in the second volume of the *Annals of Medicine*, for 1797, page 393. "For upwards of three years, I have given arsenic in the whooping-cough, with the most salutary effect. In general it has put a stop to the disease in about a fortnight, and it has never failed to moderate it in a few days. I have administered it in one unsuccessful case only, and even then it afforded considerable relief, and had I been called in earlier, or had I been permitted to pay the attention the case required, I am of opinion it would have succeeded in that also. I have used it in the form of the mineral solution of Dr. Fowler; and in the dose and with the precau-

tions recommended by him in his work on Intermittents, &c. ; children of a year old may take it with safety. Previous to and during its use, bleeding, blisters, and emetics may be employed, according to the indications, particularly the latter. It should be continued until the disease is subdued, and then left off for a week ; it should then be had recourse to for a week to prevent a return. Should exposure to cold occasion a relapse, it has hitherto put a stop to it upon being taken for a few days."

Dr. Ferrier, who has paid great attention to the treatment of hooping-cough, thinks that the only remedy which promises to shorten the disorder effectually is the solution of white arsenic.* He gave this medicine to numerous infirmity patients with tolerable success, and with much advantage in private practice. The dose for an infant was one drop daily ; and for children under seven, two drops, repeated according to the symptoms. He enjoins suspension for a day or more, and aperient medicine of a little calomel.

Arsenic has been recommended by Dr. Ternan ; and by Mr. Kimbel in this disease.† It was used unsuccessfully in three cases treated at the Carey-street Dispensary in 1811.‡ Dr. Roe has employed

* Medical Histories and Reflections, vol. iii., p. 221.

† Lancet, vol. i., 1829-30, p. 162.

‡ Edinburgh Medical Journal, vol. vii.

Fowler's solution in some cases without any benefit ; but he believes it may be useful where bark and tonics are indicated.

17. *Silver*.—In 1806, Mr. Jones, of Hall, Montgomeryshire, published a short account of the Use of Nitrate of Silver in Hooping-cough, in the Medical and Physical Journal, volume xvi. He had been much disappointed in the employment of the usual remedies for hooping-cough, and was induced to try this remedy, from its powerful effects in diseases somewhat analogous. From a pretty extensive experience, he asserts that it possesses at least equal efficacy in this troublesome disorder, to any other medicine hitherto recommended. He gave it in the form of pill, made up with a small quantity of bread-crumbs, and administered to the child in jelly.

In the *Annuaire de Thérapeutique* for 1846, it is stated that the following mode of treating hooping-cough has been found very successful in the hands of M. Berger : In the first stage, the employment of a moderate course of antiphlogistic remedies, purgatives, and repeated emetics, particularly of ipecacuanha, in combination with tartar emetic, was adopted. In the convulsive stage, in which the indication is to combat nervous irritation, M. Berger, being dissatisfied with the results obtained from the remedies ordinarily employed, was induced to administer the nitrate of silver, from which he has ob-

tained results singularly beneficial. He prescribes it in doses of from a sixteenth to a twelfth of a grain, at first three times, and afterwards four times a day : of course the remedy should not be administered in cases where the state of the digestive organs contra-indicates its employment.* Before using the nitrate, he tried in various cases, opium, morphine, belladonna, hydrocyanic acid, the hydrocyanates of iron and zinc, assafoetida, tobacco, and the sedum palustre, without finding the paroxysms mitigated by any of them.

Volz has found it useful. The oxide of silver has been also recommended and tried in this disease. Triturated with extract of hop or of hyoscyamus, Dr. Copland has given it with advantage in some cases.

18. *Iron*.—M. Lombard, of Geneva, recommended the use of subcarbonate of iron in the spasmodic stage of hooping-cough, in 1837, in the quantity of from twenty-four to thirty-six grains during the day.† Dr. Elliotson says many metallic tonics have been given, but he thinks iron is the best of them. The sulphate is a medicine which may easily be given to children, dissolved in various mixtures, or, if preferred, the carbonate mixed with treacle, as they are fond of sweets. I do not know, he says, that iron has any specific power ; but

* British-Amer. Med. and Phys. Journal, vol. iii.

† Lancette Française, in Lancet, vol. ii., 1837-38.

when the disease has existed for some time, it will be found useful.

In the second stage of hooping-cough, when the inflammatory symptoms have been subdued by appropriate treatment, remarks Dr. Graves, "I have also found the carbonate of iron, as recommended by my friend Dr. Lombard, of Geneva, a most valuable remedy. Within the last two months, (December 1st, 1842,) it has succeeded in very effectually and rapidly curing the children of a distinguished physician of this city, and I am happy to add his testimony to its utility."*

Dr. George Rees remarks, that in protracted pertussis, where a strumous diathesis is becoming developed, and phthisis may be apprehended, then the use of steel, the ferri sulphas, as recommended by Dr. Stanger, or the sesquioxide, or vinum ferri, two or three times a day, will be followed by as rapid an amendment, and often rescue the patient from the verge of consumption.†

The ammonio-chloride and potassio-tartrate of iron have also been used.

19. *Zinc*.—Dr. Moseley in his Treatise on Tropical Diseases, published in 1802, strongly recommends this substance in the following formula, which he names "*The Vitriolic Solution*":—Take of white vitriol, ʒiij; rock alum, ʒj; cochineal, gr. iij; boiling water Oj: mix, and when cool,

* Clinical Medicine.

† Diseases of Children.

filter. This he says is of great utility in all pulmonic oppressions where respiration is performed with difficulty, and where expectoration is to be promoted, and the bronchial glands are to be unloaded and cleansed ;—in nauseating, or slightly vomiting doses. In moist, pituitous habits, with phlegmatic asthmas,—in catarrhal coughs, and *above all in the moist English hooping-cough, its effects are wonderful* ; taken once or twice a day, particularly in the morning, fasting, in doses to cause a slight retching. The common dose, to create a slight retching, he states to be a table-spoonful for an adult, and a teaspoonful for a child of six months.

Dr. Copland has given the sulphate with benefit.

Barrier recommends the oxide of zinc as an antispasmodic, in the dose of from one and a half to three grains every two or three hours, without exceeding altogether fifteen grains in the twenty-four hours, for children of from five to fifteen years of age. A smaller quantity must be given to children of younger age.*

Oxide of zinc has also been recommended by Guersent and Lombard, in doses of a grain every hour. It has been praised by Crell, Percival, and Hart. Scheidemantel employed it after evacuations. Winckler and Tode gave it with cinchona ; and Storck with cream of tartar.

* *Maladies de l'Enfance*, tom. i.

20. *Lead*.—The sugar of lead has been noticed by Sauvages as a remedy for whooping-cough, in 1768, in Holland. The acetate has been highly recommended by Dr. Reece, who began its use on his own child, aged four years, by giving a teaspoonful of a mixture every six hours, composed of acetate of lead, five grains; syrup of violets, two drachms; rose water, two ounces. The cough being less frequent on the following day, he doubled the dose. After the *first* dose, the child was not heard to *hoop*, and after two days more, the cough entirely ceased. The child's health, which had been bad for some time, was evidently improved by it.* He gave it afterwards to his youngest child, and several others, with such success, that he really considers it a specific in this disease.

21. *Copper*.—In the second volume of the Lancet for 1839-40, Mr. Chavasse calls attention to small doses of the sulphate of copper in whooping-cough, which he has used in numerous cases with the happiest result. His formula is, sulphate of copper, half a grain; syrup of poppies, half an ounce; aniseed water, one ounce and a half. The dose one or two teaspoonfuls every four hours.

22. *Cauterization by Nitrate of Silver*.—Dr. Eben Watson, of Glasgow, published a paper in the London and Edinburgh Monthly Journal of Medical Science, in December, 1849, on the

* Med. Chir. Review, vol. xv. p. 37.

application of nitrate of silver to the larynx in hooping-cough.

The first case in which he attempted it, was that of a weakly boy, about eight years old, in whom the disease was already at its height. He had a severe paroxysm regularly every quarter of an hour; he was already much debilitated, and in constant danger of having some serious lesion produced in his delicate lungs. From the first time that the solution was applied to the glottis, the severity of the cough was mitigated, and after repeating the application every second day for about a week, he was found not to hoop at all. The boy then made a speedy and complete recovery of his ordinary strength under the use of the cod-liver oil.

The sister of this patient was also seriously affected by the same disease, and the application of a solution of caustic was likewise used in her case. But its effects were not so striking as in the previous case, owing to the presence of lobular pneumonia of the posterior part of the left lung. Nevertheless, the paroxysms of the hooping-cough diminished in frequency and in violence under its use; and after the pneumonia had been subdued by pretty active measures, the child ultimately made a good recovery.

Dr. Watson's third case was that of a boy, about

six years of age, in whom the disease had nearly passed without much treatment of any kind having been employed; but he still was harassed with frequent and pretty violent fits of coughing, and when excited or frightened, he still had that mode of drawing in his breath, popularly known as the "drawback." Two or three applications of the solution to the glottis and larynx of this child were sufficient to accomplish a perfect cure of his symptoms; and a short sojourn in the country, with the use of a tonic, completed his restoration to health and vigour.

He has since treated in a similar manner several other cases of whooping-cough. The results were equally favourable with those already mentioned. None of his patients continued to hoop more than eight or ten days after the solution of caustic began to be applied to the glottis; and from the first of such applications the mitigation of the symptoms was very marked. In all these cases, he says, the topical treatment is remarkably efficacious as well as speedy in its action, a few applications of the solution sufficing, in most instances, to effect a cure. He combines with the above due attention to diet, and proper regulation of the functions of the alimentary canal. He also confines his patients strictly to one apartment, suitably heated and well ventilated, until the stage of whooping has been

fairly overcome ; and then, if necessary, he recommends change of air, and the use of some tonic,—generally the cod-liver oil.

The strength of the solution is gr. xv. to the ounce, applied every second day by means of whalebone tipped with sponge, at first to the pharynx only.

Dr. Hislop, of Geneva, has also used this plan of treatment with success, and has communicated some cases in a letter to Dr. Watson.*

In a subsequent paper in the *Lancet*,† Dr. Watson says his first cases, which occurred in summer (those above described), ceased to hoop in about ten days or a fortnight after the first application of the solution ; and of late (October), in our worst winter weather, he treated several cases to a favourable *termination* in from two to six weeks.

The assertions of Dr. Wagstaffe on the topical application of caustic, in the relaxed and thickened condition of the mucous membranes, the result of hooping-cough and other diseases, have thus met with confirmation by the cases of Dr. Watson.

M. Joubert has published the results of his experience of this mode of treating hooping-cough. He has treated in all ninety-eight cases in this manner, but he excludes thirty of these as not being worthy of reliance. The remaining sixty-

* Monthly Journal of Medicine, Dec. 1849.

† Vol. ii., 1851, p. 368.

eight cases he divided into three series, according to the period at which the treatment was commenced. Of these the general results were, that in forty the cure was rapidly effected, in twenty-one a marked relief was experienced, and in seven cases only the treatment failed altogether.*

My friend Dr. Alison speaks favourably of this method in relieving the cough, in his instructive little work on the Medication of the Larynx and Trachea.

* Gazette Médicale de Paris, in Canada Med. Jour., vol i., 1852.

CHAPTER XVII.

CONTINUATION OF THE REMEDIES RECOMMENDED.

23. *Inhalations.*—*The Vapour of Tar*, Dr. Watt has devoted sixteen pages to the consideration of, in his work on Chincough; he speaks favourably of its effects, and mentions that children when inhaling it will expectorate three or four ounces of mucus from the lungs with great relief. It was useless in some cases, and injurious in others. The fumes are produced by means of red-hot pokers stirred up in tar, till the apartment is filled with a pretty thick fog. Mr. Wansbrough, of Fulham, has also strongly recommended the vapour of Barbadoes tar in the same disease, and has cured some cases.* Mr. Waddington, of Margate, in a communication to the *Lancet*, advises, in the second stage, to confine the patient to a bed-room and sitting-room upon the same floor, communicating with each other. In these rooms Swedish tar should be kept boiling, night and day, over a small lamp, and the vapour of tar will pervade both rooms. He says, when the symptoms run

* *Lancet*, vol. ii., 1828-29.

high, the effect of this simple remedy is almost miraculous.*

Fumigations of *aromatic herbs* are praised in pertussis by Dr. Dohrn, in Hufeland and Ossans' Journal for 1835.

Cherry-laurel water inhalations are mentioned under that head, at page 281, as having been used by Dr. Pavesi.

Dr. Stewart mentions that fumigation with the vapour of *benzoin* was accidentally discovered, a few years since, to allay, with remarkable quickness, the paroxysms of whooping-cough. Marley mentions that he has known, inhaling the steam of a decoction of the fresh leaves of *hemlock*, alone or with *ether*, to be of use. It is said that relief has been afforded by the fumes of warm spirits of *turpentine*. Mr. Paterson has used the *nitrous ether*.

Dr. Churchill has used *sulphuric ether* most successfully. He thus speaks of it.—“Soon after the discovery of the anæsthetic effects of sulphuric ether, it struck me that it would be likely to modify or suspend the spasm in whooping-cough; and having a case under my care, I directed that half a drachm should be poured over the nurse's hands and held before the child's nose and mouth at the commencement of the fit of coughing. The effect surpassed my expectations; generally the

* Vol. i., 1845, p. 722.

paroxysm was shortened, often stopped immediately, and the duration of the disease was unquestionably diminished. Since this I have tried *ether* in fourteen cases and *chloroform* in six. In one or two cases no benefit ensued, in others great mitigation of the spasm, and in three almost complete relief followed, when the ether was commenced at the beginning of a fit of coughing. In two-thirds of the cases the course of the disease was much shortened. In no instance was insensibility or the least inconvenience occasioned.”*

In August, 1853, the following cases, treated by Dr. Churchill, appeared in the *Edinburgh Monthly Journal* :—

Case 1.—Miss D——, aged sixteen, had had hooping-cough a month when I prescribed chloroform. There was no complication, but the hooping was frequent, especially during the night. She was directed to have the chloroform in readiness, and to use it with each paroxysm, and she assures me that in two days the hoop ceased. The cough lasted a few days longer, but it was slight, and not in kinks.

Case 2.—Miss A——, aged twenty, had been ill with hooping-cough for about three weeks, when I prescribed chloroform. The cough was not very frequent, but there was no complication. Two days sufficed with her also to relieve her of the hoop ;

* Diseases of Children.

and the slight cough which remained subsided after a week or ten days.

Case 3.—Miss B——, aged eighteen, took the complaint from her brother, whom I was attending, and I therefore had an opportunity of giving chloroform from the commencement. She did not hoop any time she coughed ; but she was directed to use the chloroform whenever she felt the tickling in the larynx, without waiting for a cough. By doing so, she found that she could postpone the cough indefinitely ; and if it came on suddenly, the use of the chloroform instantly suspended it. About three weeks elapsed before the tendency to cough and the use of chloroform ceased ; but during that time she lost neither appetite nor flesh. She slept well, was in good spirits, and able to follow her usual occupation. She went to the country quite well.

Case 4.—Master B——, aged sixteen, the brother of the last case, when I first saw him had the disease most severely. The kinks were violent and prolonged, the efforts to inspire and the hoop excessive ; it really seemed as if he would be choked, or that something would give way. He had lost appetite, sleep, and spirits, although the disease had not lasted three weeks when I saw him. I tried chloroform with him, and it at once reduced the number of paroxysms one half, but without mitigating them when they did occur.

He took the chloroform very freely, and as he was not readily influenced by it, the quantity seemed to give him a headache, and he begged to be allowed to suspend its use. I the more willingly agreed to this, as he had a severe attack of diarrhœa. I therefore substituted two drops of prussic acid with two or three black drops three times a day. The improvement begun under the chloroform continued under this treatment, and at the end of five weeks from the beginning of the disease the cough had ceased, and he had regained rest, spirits, and flesh.

Dr. Willis speaks of the good effects of *ether* in hooping-cough, in the Medical Gazette.* He remarks that the paroxysms of coughing are positively cut short by having the ether and the handkerchief in readiness, and using them when the fit is perceived to be coming on. He has sometimes allowed a fit of coughing to terminate, for the purpose of clearing the chest of accumulated mucus.

My friend Mr. B. W. Richardson informs me that he has used inhalations of sulphuric ether for some years in pertussis with the very best results.

24. *Coffee*.—Dr. Jules Guyot, who advocates the use of this remedy, writes thus in the Union Médicale, for 24th April, 1849 :—" *Café à l'eau*,

* Feb. 12, 1847, p. 271.

hot, and well sugared, in suitable doses, taken four times, or oftener, daily, will cure, in from two to four days, the most obstinate cases. For a child of two years, the dose is a teaspoonful ; for a child of four years, a dessert-spoonful ; and for an elder patient, a table-spoonful. (?) To obtain a rapid and permanent cure, it is necessary to conjoin with the coffee treatment a diet of fried and roast meat, taking care to mince it, if the child cannot masticate it sufficiently. The quantity of milk used ought to be diminished ; and farinaceous food, confectionaries, and fruits must be entirely prohibited." He accidentally discovered the use of coffee by observing a child, aged four years, ill with measles and congestion of the lungs. The coughing was so severe that death was imminent, when a teaspoonful of coffee was given, after a like quantity of beef-tea, which before this could not be retained. Two hours after, the child ate some cutlet with its dose of coffee. The night was passed well, and after a few days, under a continuation of the coffee, the child recovered. Seriously reflecting on this case, Dr. Guyot met M. Bouju, ex-notary of Franconville, who told him that he had been obliged to have double doors for his study, to keep out the terrible and incessant noise caused by his two children with hooping-cough. Dr. Guyot detailed the case above narrated ; and he cured both his children in four days by means of coffee. He has

since tried the remedy successfully in above sixty cases.*

A decoction of unroasted coffee was given by Hufeland in this disease. Coffee has been used by Dr. Pickford in the diarrhœa of children with success.†

25. *Peruvian Bark*.—Millar, Dr. Whytte, Dr. Sims, Cullen, and others, have recommended this in hooping-cough: the last-named author, in combination with opiates. Dr. Watt says it is a remedy which may be resorted to with great advantage, at the conclusion of the disease. Quarin, Courbette, and many of the Germans use it.

26. *Quinine*.—Trousseau and Barrier approve of small doses of quinine, as an antiperiodic in hooping-cough.

Dr. G. A. Rees says, "When, from the protraction of the affection and violence of the cough, the constitution is shaken, and the digestive functions impaired,—when the flesh is flabby, the countenance anæmic, the tongue pale and flabby,—in such a child, give sulphate of quinine in doses repeated twice a day, and the symptoms will disappear most rapidly, and the cough may cease as if checked by some powerful specific."‡ Dr. C. Johnston recommends it in the last stage when there

* London Jour. of Medicine, Aug. 1849.

† Medical Gazette, 1848.

‡ Diseases of Children.

is debility. Dr. Copland says, when the disease is protracted, and assumes an intermittent or periodic type, quinine or cinchona ought never to be omitted.

27. *Hydrochloric Acid* was first proposed by Dr. Thiel in whooping-cough. He gave the pure acid in the dose of two or three drachms in six or eight ounces of water sweetened with simple syrup or the syrup of raspberries. He administered this by spoonfuls every hour throughout all periods of the disease, and in his enthusiasm for his specific, as Guersent remarks, he was not prevented from using it even when the disease was complicated with chest affections.

Guersent has only slightly employed it, because the greater number of children did not appear to become accustomed to its use.

During an epidemic which raged at Erlangen in the autumn and winter of 1819 and 1820, the ordinary methods, and above all belladonna, the golden sulphuret of antimony, and the different preparations of opium, were used unsuccessfully by Dr. Henke, and frequently increased the fever and the cough. He found on the contrary hydrochloric acid to be very efficacious and of the greatest benefit.

The Clinical Institute of the same town treated upwards of seventy children by this acid, and a very small number only of these continued its use

beyond fifteen days. All these children were cured, although many were dangerously affected, with the exception however of two patients; one aged a year, having the disease complicated with dysentery, and the other with scarlet fever.

Guersent thinks that the powerful testimony in favour of this treatment by Dr. Thiel requires us not to neglect it entirely, but he says it is very dangerous to employ it in large doses when there is inflammation of the chest.*

In the treatment of the third stage, Dr. West speaks as follows:—"In other cases in which the cough continues violent after the other symptoms have abated, and in which, though there is no superabundance of secretion in the air-tubes, yet the attacks of cough often end with the rejection of a considerable quantity of mucus from the stomach, and loss of appetite and general dyspeptic symptoms are present, the hydrochloric acid is often of much service. It has been recommended as a specific against hooping-cough, in doses of from two to six drachms daily; but I have never employed it in other than moderate doses, such as it would be administered in under other circumstances."

28. *Sulphuric Acid*.—A writer in the *Lancet*† calls attention to the speedy relief afforded in

* *Diet. de Médecine*, vol. vi. p. 20.

† Volume ii., 1845, p. 112.

hooping-cough, by a dose of from fifteen to twenty drops of dilute sulphuric acid, mixed in a teaspoonful of moist sugar, taken three or four times a day. "I sometimes prefer," he says, "giving an ounce of this 'elixir' in a pint of water, with two ounces of simple syrup; the dose a tablespoonful, three or four times a day. This popular remedy has been found so useful here (Ipswich), during the last two or three years, as to be considered almost a specific."

29. *Nitric Acid*.—This acid was first recommended by my friend and late colleague, Dr. Arnoldi, of Montreal, as a remedy in pertussis, attended with the most remarkable success, and has been adopted by me at his suggestion before he published his observations. It is fully considered in the Chapter upon the treatment of the uncomplicated affection, the eighteenth.

It may be remarked, however, that it has succeeded over and over again when other means have failed, and it is not such a hazardous remedy, when administered with ordinary precaution, as many described in the preceding pages.

His method of prescribing the acid for hooping-cough or asthma is as follows:—

To a tumblerful of very sweet water (almost syrup) add as much acid as will bring the water to the strength of pure lemon juice, when it is ready for use. An adult may consume this quantity in

three or four hours. A child one year old may take a dessert-spoonful every hour.

He has remarked that the efficacy depends on the amount taken, and that especially by the frequency of repetition, so that he confidently asserts there is not the slightest risk of an overdose.

To save the teeth, he advises a solution of carbonate of soda, two drachms to eight ounces of water, to be used as a gargle immediately after taking the acid. This of course is not required in infants.

30. *Cochineal*.—In consequence of seeing in an English paper the receipt for a very old English specific for hooping-cough, Dr. Cajetan Wachtl, of Vienna, was induced to give it a trial. The receipt was—cochineal, fifteen grains; carbonate of potass, fifteen grains; sugar, one ounce, and water, six ounces. A teaspoonful was given three times a day. He treated nine children with it in all stages of the disease, and its efficacy was so instantaneous and constant, that notwithstanding the paucity of cases, Dr. Wachtl felt authorized to regard cochineal as a specific in hooping-cough. The cure was produced in from two to eleven days, diminishing the number of fits from the first day it was taken.

In Scotland it appears the above mixture has been used from time immemorial, but is made much stronger—namely, cochineal, ten grains; salt of tartar, twenty grains; water and simple syrup, of

each half an ounce: a teaspoonful to be taken four times a day.

The following is Dr. Wachtl's manner of exhibiting this remedy:—Take of cochineal, one scruple; sugar, one ounce. Dissolve in six ounces of warm water. The dose is three teaspoonfuls in the twenty-four hours. The solution ought not to be kept longer than thirty-six or forty-eight hours, because after that time it assumes a brown hue, and a sour taste, which renders it unfit for use.*

Dr. Charles Aberle, of Salzburg, in his *Observations on Epidemics of Hooping-cough*,† states in relation to this substance:—Ammoniated tincture of cochineal, given in five-drop doses of the following preparation, mornings and evenings, was found apparently to diminish the time occupied by the disease, and to render the period of convalescence less tedious. This tincture is made with powdered cochineal, half an ounce; liquor of ammonia, half an ounce; rectified spirits of wine, seven ounces: mix. Dr. Aberle remarks, with the before-mentioned doses, Dr. Wachtl, of Vienna, cured nine cases in from three to eleven days! It must be remembered that these cases occurred in the summer months, when cure is generally more

* See the *Lancet*; vol. i., 1844; *Edin. Med. Journal*; *London Med. Gazette*, January, 1844; and *Pharmaceutical Journal*.

† Reviewed in the *Lancet*, vol. i., 1846.

rapid. How far might not the ammonia contribute towards the good effects of this mixture?

Dr. Aberle, I think, is in error, in supposing that Dr. Wachtl used the ammoniated tincture; it was the simple infusion which he employed.

In an estimation of the comparative value of cochineal, fumigations with cherry-laurel water, the use of vegetable acids, &c., in the treatment of whooping-cough, by Dr. Pavesi, in an epidemic of this disease which prevailed during the entire spring of 1850, at Candie (Lomelline);* of 122 children who were under his care, he treated 27, who were delicate, and the disease intractable, exclusively with cochineal. Signor Pavesi prescribed for his little patients the following mixture: cochineal and carbonate of potass, of each eight grains; sugar, one ounce; water, four ounces: mix. A tablespoonful to be taken every two hours. This treatment was employed alone, with the exception of a purgative when required. The results were satisfactory; not that the disease was arrested in its progress or even shortened, but the paroxysms were rendered less intense; and whenever the little patients omitted to take their cochineal, the attacks were more frequent and distressing. They all recovered. (See cherry-laurel in the last chapter, and vegetable acids further on.)

* *Giornale dell' Accademia Medico-Chirurgica di Torino*, and Ranking's Abstract, vol. xiv.

A writer in the New York Medical Gazette recommends very highly the following prescription for whooping-cough, to be given in teaspoonful doses three times a day. He regards the cochineal as the active principle of the preparation, and hence gives it in larger doses than usual.

Cochineal, in very fine powder . . .	3ij.
Carbonate of potash	3i.
Sugar	3i.
Tincture of spearmint	3ij.
Water	3 xiv. Mix.

31. *Alum.*—In reference to the therapeutic value of alum in whooping-cough, Dr. Golding Bird remarks :—" During the last three years I have extensively prescribed this drug in whooping-cough. Like all other remedies which have been considered specific, its administration will end in disappointment, unless discrimination be used in selecting the proper stage for its exhibition ; but with this precaution I have no hesitation in expressing an opinion, from the experience I have now had of its therapeutic value in whooping-cough, that in one stage of the disease alum will be found a most valuable remedy.

"It is unnecessary to allude to the distinct stages observed in every case of pertussis, further than to remark that it is important to distinguish between the first, acutely inflammatory or catarrhal, and the second, or nervous, in which the

spasmodic cough, with a more or less copious bronchial flux, exists. In the first stage, the use of any reputed specific would of course be avoided by every experienced practitioner, the safest treatment being that of ordinary bronchitis. But after the persistence of the disease for a week or two, and all inflammatory symptoms have subsided, and when, with a cool skin and clean tongue, the little patient is harassed by a copious secretion from the bronchi, the attempt to get rid of which produces the exhausting and characteristic cough, alum will be found of much value. I have not yet met with any other remedy which has acted so satisfactorily or afforded such marked and rapid relief; the dose has generally ranged from two to six grains. For a child of two or three years the following formula has usually been employed:—

Aluminis, grs. xxv; Ext. conii, grs. xij; Syrup.

Rhœados, ʒij; Aquæ anethi, ʒiij. M. ft.

Capiat coeh. j med. 6 quâque horâ.

Dr. Bird further states that no ill effects are perceived upon the bowels from the astringent qualities of the medicine. He does not explain the *modus operandi*, but thinks that it acts by allaying spasm and restraining inordinate bronchial secretion. He has used alum with equal benefit in the bronchorrhœa of emphysema.*

In the last edition of Underwood's Diseases of

* Guy's Hospital Reports, 1845, and Ranking's Abstract, vol. i.

Infants, Dr. Davies thus speaks of the employment of alum in pertussis ;—" After a long trial, I am disposed to attach more importance to alum as a remedy in whooping-cough than to any other form of tonic or antispasmodic. I have often been surprised at the speed with which it arrests the severe spasmodic fits of coughing ; it seems equally applicable to all ages, and almost to all conditions of the patient. I was formerly in the habit of taking much pains to select a certain period of the illness for its administration, and of waiting until the cough had existed at least three weeks, taking care that the bowels were open, the patient free from fever, the air-passages perfectly moist, and the disorder free from complication of any bruit. A continued observation of the remedy, however, has induced me to be less cautious, and I am disposed to think that a very large amount of collateral annoyance will subside under its use. The fittest state for its administration will be a moist condition of the air-passages and freedom from congestion, but an opposite condition would not preclude its use, should this state not have yielded to other remedies. It generally keeps the bowels in proper order, no aperient being required during its use. The dose for an infant is two grains daily, and to older children, four, five, and up to ten or twelve grains may be given, mixed with syrupus rhæados and water. It is seldom disliked."

Mr. David Davies, of Bristol, speaks very highly of the use of alum in whooping-cough.* He believes it acts as a nervine tonic, and so removes the spinal excitability existing at the origin of the nerves of respiration.

In the third stage, when the bronchi are loaded with secretion, the skin cool, tongue moist, soft but weak pulse, Dr. West prescribes alum in the doses of three or four grains every four or six hours, for a child of a year or eighteen months old. It proves of much service in this condition, diminishing the secretion, arresting the sickness, and rendering the cough much less frequent.

Alum was used by Dr. Moseley, in 1802, in combination with sulphate of zinc and cochineal. (See zinc in last chapter.)

32. *Tannin*.—M. Sebergondi has found decided benefit from the employment of this substance in the asthenic stage of whooping-cough. He has given it in doses of from a quarter to half a grain every two hours, in conjunction with sedatives, as hyoscyamus, and also with purgatives.† Aberle has used tannin in the third stage, with the happiest effects. He gives it, either alone or in combination with benzoic acid, in doses of one sixth, one half, or three quarters of a grain. Professor Fuchs,

* *Lancet*, vol. i., 1849.

† *Ibid.*, vol. i., 1842-43.

however, employed it with the best results, especially in a case complicated with epistaxis, in doses of from one to three grains every second hour.*

Dr. Durr, in the *Medècinische Correspondenz Blatt*, speaks of the beneficial action of tannin and benzoïn in the latter stages of whooping-cough. He prepares powders, containing from two to five centigrammes of each, with fifty centigrammes of sugar. One is given every two hours.†

The formula, as used in the Hôpital des Enfants in Paris, is—tannin and benzoic acid, of each gr. ij; powdered gum arabic ʒj: to be divided into twelve powders; one every two hours in sweetened water.‡

Volz has found tannin useful. There is no doubt whatever that tannic and gallic acids, as astringents, are especially useful in checking excessive bronchial secretion.

33. *Vegetable Acids*.—Dr. Pavesi treated six cases of whooping-cough of a mild form with these, out of 122 children who were under his care. They were employed as recommended by Dr. Schmidt, of Hengersberg, and by Geigel. Tamarinds, vinegar, lemonade (*ad libitum*), apple juice with sugar, and syrup of barberries, were given in

* *Lancet*, vol. i., 1846.

† *Prov. Med. and Surg. Journal*, April, 1850.

‡ *Nelson's Northern Lancet* (N. Y.), vol. iii.

quantity according to circumstances. The efficacy of this plan was doubtful, and the disease, moreover, lasted six weeks.*

34. *Alkalies* were originally used for the purpose of arresting the acidity of the secretions of the stomach and bowels in this disease. Dr. Stutz was the first who used the *carbonate of potash*, as mentioned in Hufeland's Journal. Dr. Memminger, of Reutlingen, successfully tried it, preceding its use always with emetics of ipecacuanha and vin. antim.† The carbonate of potass has been used for very many years in Scotland combined with cochineal, as has been shown when speaking of the latter. Dr. Pavesi used it with cochineal, in twenty-seven cases of hooping-cough. They all recovered. May not the potash have as much effect in curing the disease as the cochineal? Dr. Gregory, in his work on Practice of Physic, recommends the combination of carbonate of potass or soda with aperient medicines when the latter are required. Dr. Richard Pearson‡ has spoken in high terms of the combined influence of an expectorant (vin. ipecac.) with an anodyne and absorbent, (*carbonate of soda*.) He strongly recommends the following formula: Carbonate of soda, 24 grains; ipecacuanha wine, ʒj; tincture of

* Ranking's Abstract, vol. xiv.

† Med. and Phys. Journal, vol. ix.

‡ Medico-Chir. Tran., vol. i., p. 23.

opium ℥vi, syrup ʒiij, water one ounce; a sixth part to be taken every six hours. He does not recommend this prescription to the exclusion of other remedies. Dr. Armstrong, in his Lectures, recommends carbonate of potash or soda in addition to other means, to prevent acidity. *Sulphuret of potash* was recommended as a cure for whooping-cough, by M. Bland, chief physician to the Asylum of Beaucaire. He states that, after giving one grain of the extract of belladonna to an adult, for eleven days, without any relief, he prescribed ten grains of the sulphuret of potash mixed with honey, night and morning, and the benefit was immediate, and in seven days the cure was complete. In another case, in which the symptoms were so violent as to require venesection, and for which he had prescribed belladonna without any benefit, he gave ten grains of this medicine daily, and in twenty-five days the cure was complete. In six cases of adults in which he administered this remedy, the spasmodic cough, he says, ceased after the second dose, and the catarrhal cough disappeared after a few days.*

Mr. Kimbel has used the same remedy with advantage.

Dr. Copland has preferred the *liquor potassæ*, or Brandish's alkaline solution, especially in the scrofulous diathesis, and in cachectic habits.

* *Révue Méd.*, and *Lancet*, vol. ii., 1830-31.

Liquor Ammoniac has been recommended by Dr. Levrat-Perroton, of Lyons, in whooping-cough.* The following is his prescription :—

℞	Aq. destil. lactuæ vir.	. . . .	℥iv.
.	„ flor. aurant.	. . . .	℥ij.
	Syrup. pæoniæ officin.	. . . .	℥i.
	„ belladonnæ	. . . .	℥ij.
	Ammon. liquor	. . . .	gtt. vi. Misc.

Dose, a tablespoonful every four hours. Four cases are quoted as proofs of its efficacy; the cure in all was rapid and complete. Barrier thinks from the narcotics entering into the foregoing formula, that the cure was in some measure owing to them, and not the ammonia only. Dr. R. H. Allnatt recommends a liniment composed of harts-horn and oil of amber, of each half an ounce; to be well rubbed over the whole course of the spine, morning and evening, in addition to a mixture containing carbonate of potass and cochineal.† *Muriate of ammonia* was recommended by Stoll with oxymel, at an early stage. Dr. Copland has found it an excellent refrigerant antispasmodic and tonic in several instances. He also speaks of the carbonate and other preparations in small doses, as frequently beneficial in cases of debility at an advanced period, or when the complaint is protracted.

* Ranking's Abstract; and Barrier, *Mal de l'Enfance*.

† *Lancet*, vol. i., 1846.

35. *Vaccination*.—Various facts collected by MM. Thomson, Chevalier, Thomas Adam, Ferrari et Ambrosiis, Boccardi, Orlandini, Mattura, Fabronne, Durando, Gombette et Vacane,* have seemed to prove that vaccination has succeeded in cutting short the duration of the disease. But the numerous observations of Constant have shown that generally this method of cure is without any efficacy. M. Blache has met with the same want of success, and Barrier, during his residence at the Hospital for Sick Children in Paris, never observed the happy changes said to arise under the influence of vaccination.†

Jumer has pointed out the efficacy of vaccination in mitigating, if not preventing, the extension of whooping-cough. The Italian physicians made some experiments in relation to this question which deserve to be repeated on a more extensive scale.‡

M. Griva, director of vaccinations at Turin, in a memoir on Variola (*il Severino*), speaks of the cases of whooping-cough reported by Drs. Ferrari and Ambrosiis, which had been much mitigated by vaccination. During the course of the varicella the spasmodic cough gave place to a simple cough of slight bronchitis, and in some instances the disease was very manifestly abridged. During an

* Gazette Méd. de Paris, 1834, p. 539.

† Mal de l'Enfance, vol. i., p. 158.

‡ Lancet, vol. ii., 1833-34.

epidemic of hooping-cough, Dr. Boccardi also employed vaccination on very young children, and found that the mortality previously caused by the disease was immediately arrested; the cough assumed a milder character, and was in most cases limited to three or four weeks.

Okes, Cleeve, and Moutain have recommended it as a preventative.

Mr. Linacre has employed vaccination as a means of relief in two cases, with a cure in a month from its performance. The disease had existed fourteen days before he inserted the vaccine lymph. As the vesicle proceeded to maturity, the severity of the paroxysms became remarkably mitigated, and in their frequency they were much diminished.*

36. *Cantharides* was first recommended by Dr. Burton, of York, in his Essay on Chincough, published in 1738. He prescribes a scruple of cantharides and a scruple of camphor, to be well mixed with three drachms of the extract of bark; and eight or ten grains of this mixture to be given to children every third or fourth hour, according to the circumstances of the case, in a spoonful of water, in which a little of the balsam of copaiba was dissolved. He cured many cases in from five to six days.

Another form, but less disagreeable to children, has been recommended by Mr. Sutcliffe, of Settle;

* Lancet, vol. ii., 1838-39.

tincture of bark, half an ounce ; paregoric elixir, half an ounce ; tincture of cantharides, one drachm : small doses of this mixture to be given three or four times a day, and gradually increased till a slight strangury is excited ; then the dose is to be diminished, or taken at more distant intervals. Sometimes it succeeded without any strangury, and the hooping generally ceases in three or four days. Mr. Sutcliffe never lost a patient with hooping-cough.

Dr. Lettsom, who was a pupil of Mr. Sutcliffe, states that the use of this remedy has been attended with similar success in his own practice.

Hufeland drew attention to this medicine in 1803, and found it a most excellent remedy in hooping-cough. He gave it in the dose of from three to eight drops in mucilaginous and bitter remedies, sometimes with bark, three times a day. He found it of great use when combined with opium.

It has been recommended by the late Dr. Beatty, and subsequently by his son, my kind friend, Dr. Thomas Beatty, of Dublin. In Dr. Graves' Clinical Medicine it is highly spoken of. He says, many authors have mentioned the tincture of cantharides as a medicine which has occasionally proved useful in hooping-cough. Most practitioners, however, are prejudiced against its employment, and prefer remedies which are not so likely to excite anxiety in the mind of the physician during the period of

their exhibition. "Such I confess were my former feelings upon this subject, and my antipathy to the tincture of cantharides would have probably continued, had I not been persuaded by my friend, Dr. Thomas Beatty, to give the medicine a fair trial. He alleged in its favour his own experience, and that of his father, who had for many years employed the tincture of cantharides in the following formula:—

R Tinctura Cinchonæ composita, ʒv.

„ Cantharidis.

„ Opii camphorat. āā ʒss.

M.

Ft. Mistura.

One drachm of this may be taken in linseed-tea or barley-water three times a day, and if no strangury is produced it may be increased. A smaller dose will be necessary for an infant." It proved very successful in Dr. Graves' hands, who further remarks that it produced no urinary irritation in a great number of cases.

Dr. Copland has prescribed it in a number of cases, and found it to diminish the frequency and severity of the fits in the nervous stage, especially when irritation of the urinary organs was present.

Dr. M'Gregor has furnished additional testimony of the value of this formula in hooping-cough.*

Dr. Hamilton Roe tried this remedy in a few cases, but did not perceive that it produced any

* The Lancet, vol. ii., 1846.

good effect on the disease. Dr. Watson, in his Lectures on Medicine, thinks that digitalis and cantharides are hazardous remedies.

37. *Musk*.—Cullen does not speak favourably of this remedy. Mr. Hayes has found it useful, and gave from ten grains to half a drachm, with sugar, three or four times a day. Wolff, Horn, Gesner, and others, have recommended it. Marcus combined it with the sulphuret of antimony and magnesia. The *Artificial Musk*, invented by Margraf, and sanctioned by Van Swieten and Stöeller, has been strongly recommended by Hufeland, and generally goes by his name. He gave it in the form of emulsion. Mr. Bartly, of Bradford, prescribed it with success in the form of tincture. Dr. Bellamy, of Preston, found the same remedy beneficial in a very hopeless case.* Aberle writes that Hufeland's artificial musk was found to produce no effect in his hands.

38. *Assafœtida*.—Dr. Millar first recommended this in 1769 in whooping-cough and asthma, but it appeared to be only successful when the disease was mild. Dr. Durr praises its use in the form of a clyster, the cough ceasing in two or three weeks.† Kopp states that children take this remedy with pleasure, when associated with an equal quantity of mucilage and syrup.‡ Aberle has found assa-

* Watt's Treatise.

† Laneet, vol. i., 1837-38.

‡ Barrier, vol. i., p. 154.

foetida to be one of the most valuable antispasmodics in whooping-cough, but says it must not be employed whilst any marked symptoms of fever or of bronchial congestion are present. The disagreeable odour and taste of this substance must render it exceedingly repugnant to infants and young children.

39. *Meadow Narcissus* cured, in the form of extract, forty-two children with whooping-cough, which was raging at Valenciennes in 1786, according to M. Dufresnoye. Laennec says, that the infusion of the petals of the same plant, and the extract, prove a sort of specific in whooping-cough during some years. He has performed cures with this plant alone, rapidly, in five or six days.

40. *Cup Moss, Muscus or Lichen pyxidatus*, mentioned by Willis as a specific, and noticed by other authors, was a common remedy in the hands of old women, according to Mr. Hayes. Gerarde remarks, that "the powder of this mosse, given for certaine daies together, is a most certaine remedy for that perillous malady, the chin-cough."

Dilenius praised the powder of it, when frequently given, and supported his opinion by the authority of Willis and Gerarde. Other writers have prescribed it in the form of decoction in milk. Van Woensel recommended it in decoction, sweetened with syrup of mint.

Baglivi employed also the *Muscus arboreus* and *M. quernus* in pertussis, in the form of decoction; and a syrup prepared from the decoction exists in the Wirtemberg Pharmacopœia, to facilitate its exhibition to children. Stoll found these mosses or lichens, particularly that growing on the oak, very serviceable in the whooping-cough, which was epidemic at Vienna in the spring of 1775; Frank also praises it.*

41. *Castor* was recommended by Dr. Morris in 1767, but Cullen found it ineffectual. It was much employed by Morris and Horn.

42. *Nux vomica*.—The extract was recommended by Michaelis and Hufeland, conjoined with the extract of *carduus benedictus*. Dr. Copland has used it with manifest advantage, in circumstances similar to those in which he employed cantharides. But he says neither the one nor the other ought to be resorted to in the first stage, or in the inflammatory complications.

43. *Miscellaneous other Remedies*.—*Lobelia inflata* has been praised by Eberle and Dr. Andrews. Two drachms of the tincture added to the same quantity of syrup of squills has been given in doses of from sixteen to twenty minims, four or five times a-day, for a child of two years of age. This remedy alone is used in emetic doses by the Thomp-

* Copland's Medical Dictionary.

sonian practitioners in the United States. As an emetic when required, it is both a safe and a very valuable remedy.

Polygala Seneka.—The Senega or Virginian snake root is a medicine of much value in the complications of pneumonia and bronchitis, and has proved very serviceable in my hands. It is strongly recommended by many American writers, and among others by Dr. Dewees, in the form of Coxe's hive syrup, which is made by boiling half a pound of senega root and dried squills, in eight pounds of water, over a slow fire, until half is consumed, and then adding to the strained liquor four pints of strained honey, and again boiling down to six pounds, and adding a grain of tartar emetic to each ounce. The dose must be regulated according to the age of the child, from six to eight drops or upwards, every hour or two.*

Coro-watti.—A medicinal plant used by the natives of British Guyana, in hooping-cough and other diseases, formed the subject of a paper by Dr. John Hancock before the Medico-Botanical Society,† and possessing this name. The infusion and syrup of the bruised root of this plant were used, and speedily cured an entire family.

Lactuca virosa.—Dr. Gumprecht speaks most highly of the extract of this, in the second stage,

* Dewees on Diseases of Children, p. 437.

† Lancet, vol. i., 1836-37, p. 719.

in doses of half a grain, with sugar, three times a day, for children of two years of age.*

Oil of Amber was recommended by Underwood internally, when the spasms were exceedingly urgent.

Valerian has been used by Mr. Kimbel and others, combined with opium and squills.†

Elder Bark, the *Sambucus niger*, has been used as a preventive of whooping-cough.

Potato; an infusion of the leaves and flowers has been recommended by M. Reichnelt.‡

Turnips.—Slices of the common garden turnip, covered with Canadian (maple) sugar; concentrated *docoction of black pepper*, with an equal quantity of maple syrup; *onion* and *capillaire* syrups; are all mentioned as popular remedies, by Dr. Von Iffland, of Quebec.§

Guaiacum was recommended by Hufeland and Veizhans; *saffron*, by Theussink; *Geum urbanum*, by Keck and Buckhaave; *Phellandrinum aquaticum*, by Von dem Busch; *isinglass*, by Heineken and Gautieri; *marsh-mallows*, by Wahlborn; *acetic acid* with sugar, by Hannes; *sulphur*, by Sydenham, Quarin, and Unzer; *wild rosemary*, by Linnæus and Wahlborn; *colchicum*, by Haden and Alcock; *Rhus vernix*, *garlic*, *electricity*,

* Med. Chir. Trans., vol. vi. p. 608.

† Lancet, vol. i., 1829-30, p. 162.

‡ Gazette des Hôpitaux, Aug. 1845.

§ Montreal Med. Gazette, vol. i.

millipedes, spurge-laurel, camphor, sal ammoniac, salacine, and chloride of barium, by others.

Mr. Edmondstone advises the wearing of some *conspicuous article of dress*, so that those who felt inclined, might keep beyond the sphere of contagion.*

Tracheotomy.—In the second volume of the *Lancet* for 1852, Dr. Marshall Hall has given a most important and valuable table of cases requiring tracheotomy. In the second division of this table, namely, cases of spasmodic laryngismus, it will be observed that “*Pertussis threatening convulsions or hydrocephalus*,” forms its seventh division.

He concludes his paper with the following questions :—

1. What is the *abortive* form of malady left by tracheotomy in the various *convulsive* diseases ?
2. What would be the *abortive* form of malady left by tracheotomy in formidable cases of *pertussis* ? &c. &c. &c.

The recommendation of this operation in certain forms of *pertussis*, as well as in other diseases, emanating from such high authority, is deserving of attention in those cases likely to prove fatal from their highly dangerous character, in their complication with frequently recurring convulsions.

* *Edin. Med. Journal*, vol. vii.

CHAPTER XVIII.

TREATMENT OF SIMPLE PERTUSSIS.

ONE of the objects to be always kept in mind in the treatment of the simple form of this affection, is to keep it simple, and to guard as much as possible against the danger of the complications—bronchitis and pneumonia especially.

The disease, if left to itself, will in some instances run its usual course, and many physicians assert that this cannot be shortened or even interrupted by medicine. This is at variance with my own experience, and that of my friend Dr. Arnoldi. In one remarkable instance under my care, that of an infant nine months old, in the commencement of the second stage, the disease was completely cut short in two days, followed by cure. Dr. Roe entertains the same opinion as ourselves.

On no account whatever should the child be allowed to cough it out, as is permitted by some mothers, who declare that it is *only* the whooping-cough that the child has.

One of the causes of mischief, if not the principle one, is the violent and long-continued paroxysms of coughing, the consequences of which

have been already mentioned in other parts of this work—as congestions of internal organs and their subsequent results, the fertile sources of many of the complications, at a period of life, too, peculiarly favourable to their development.

Protraction of the disease is equally as dangerous as the severity of the symptoms.

To mitigate these, and to shorten their duration as quickly as possible, is the aim to be held in view; and as a learned writer has properly remarked, any remedy which can be found to arrest the disease, will be received with satisfaction.

Dr. West remarks that there is nothing unreasonable in the expectation that a remedy may some day or other be discovered, “which shall cut short its course with as much certainty as quinine arrests an intermittent fever, or which shall render the constitution insusceptible of its poison as infallibly as cow-pox preserves from variola.” And Dr. Todd observes, that if we could find some material, which, when introduced into the system after it had received the poison, would neutralize that poison, then we should have the same power over this malady as we now possess over intermittent fever.

It would be presumption in me to say that this substance has been discovered, but in its effects upon the disease, *nitric acid*, in whatever manner administered, not only arrests the paroxysms and

removes the hoop, but shortens the disease almost as effectually as quinine does intermittent fever.

It not only produces a powerful antispasmodic effect, but an equally tonic influence, and supplies to the blood an element—nitrogen—which removes or neutralises the excess of fibrine existing in that fluid—one of the dangerous elements of the disease—and so destroys the poisonous principle combined with it, which is the primary cause of the affection.

If this remedy cures pertussis, it differs from the great majority of others, in the fact that its action in the economy can be explained upon rational grounds.

Nitric acid possesses antiseptic properties in a high degree, and probably the influence of these assist materially in the cure by acting directly on the blood as well as supplying its nitrogen, and prevents the too rapid generation of the fibrine from the albumen.

The nitrogen acts also as a sedative, in diminishing the stimulating effect of the oxygen so rapidly absorbed, and as an antispasmodic in allaying irritation, and therefore lessening the severity of the paroxysms. If hydrocyanic acid is useful in many cases, it is as much owing to its nitrogen as the sedative and antispasmodic properties which it possesses.

The presence of the excess of fibrine has been

elsewhere explained to depend upon the frequent respirations, immediately after the paroxysms have ceased ; it may also be influenced by the peculiar poison itself which has contaminated the blood. Whatever remedy will check this tendency materially assists in the cure ; it is in this manner that ether and chloroform act by arresting the process of sanguineous super-oxidation, and, with the other properties possessed by those agents, equally assist in the cure.

As a general tonic, nitric acid possesses the advantages in pertussis of rapidly allaying the dyspepsia, which is sometimes accompanied with sickness and irritability of the stomach. It restores the healthy state of the mucous membrane of the bronchi, it arrests the spasm, diminishes the cough, and finally dispels the hoop altogether.

Dr. Arnoldi and myself have never met with any ill effects from its use, and all the cases treated by it were carried to a successful issue, the cure in all being very speedy, with few exceptions, and the disease being at the same time abridged in the length of its ordinary duration. So far as experience has shown, relapses after cure are very rare indeed.

Should inflammation of the lungs or abdominal organs have set in previous to its employment, it must be avoided, and the treatment must be adopted as recommended for those complications in the next chapter.

But if we have reason to fear congestion of the brain or convulsions, the acid may still be safely given and with good results, for the purpose of lessening the paroxysms. It will also prove useful in the remittent fever, combined with other substances, if there be no existing irritation.

The details of a few cases only will now be given to illustrate the successful effects of this remedy, as all possess a similarity in their general features.

My friend Dr. Arnoldi has treated upwards of one hundred cases of pertussis with nitric acid, with the most satisfactory results, and since I commenced its use, sixty-seven cases were cured at intervals varying from two to fifteen days, but averaging between six and seven days.

It may be as well to mention here that the object entertained by Dr. Arnoldi, in using this acid as a remedy in pertussis, was to introduce the elements of the atmosphere into the blood by the process of gastric digestion, so as to enable the lungs to outstand the stage of temporary asphyxia, which always is induced during a severe paroxysm. Whether the theory be correct or not, the result, he says, of his practice has been almost universally successful.

I think it not improbable that the greater portion of the oxygen is chemically appropriated before the blood becomes sensibly relieved by the

nitrogen, because if it were not so, a still greater amount of fibrine would be formed, and a tendency to aggravation by inflammatory complication would be the result.

The following is an outline of a few of Dr. Arnoldi's cases, kindly communicated to me by letter:—

The four children of a medical *confrère* were violently affected in the depth of a very cold winter, three years ago, with all the disadvantages of being kept within doors in the intensely dry atmosphere of stove heat. In less than five days all were relieved by the use of the acid, and within three weeks they were all perfectly cured.

At the post-office, the same winter, he saw two poor children in exactly the opposite condition, being turned out of house and home to beg, and who from their exposure were most alarmingly affected. To these was given a quart bottle of the acid mixture, which they took strictly, and when finished they applied for another, being very much relieved; they were cured before the second mixture was taken.

In his own family, his youngest child, aged six months, at the breast, was cured within a week. An elder child, who could not be prevailed upon to take it at first, suffered dreadfully for two months, after which he took a liking to it, and got well within a fortnight from the commencement of its use.

He was called to two families residing at opposite extremities of the town. Each had a lad about nine years of age so violently affected for several weeks that, besides bringing on bleeding from the nose, they were both ecchymosed round the eyes, as though they had been severely beaten. Both these boys were perfectly cured with three drachms of the acid, in two and three days.

The case of a young lady, Miss S——, aged fourteen, was very remarkable. She had been suffering for several days very much, and as she was of a very delicate habit of body, fears were entertained of the supervention of phthisis. She took the acid very freely; she slept well the first night without a single paroxysm, and after the second day's treatment coughed no more.

Another child at the breast, seven months old, was cured in eight days.

As a good deal of similarity prevails in the general symptoms, it will be unnecessary to do more than to observe that the treatment was successful in all, at periods varying from two to twenty-one days.

Dr. Arnoldi met with a few cases where the disease seemed to resist the action of the acid, owing to "spinal torpor at the track of the eighth pair and phrenic. In these the application of an ointment of the biniodide of mercury, so as to

produce the specific eruption, and this reproduced a second and a third time completely restored the efficacy of the acid."

Among my own cases were :—

An infant nine months old, at the breast, and in the commencement of the second stage, who was cured in the short space of two days.

Other children were cured in three and five days.

A child of Mrs. John D——, aged two years, and ill six weeks, was violently affected with the disease, the paroxysms and hoop occurring frequently during the twenty-four hours, appearing to threaten suffocation. The acid on the first day lessened both their frequency and violence, on the third day they were greatly diminished, and by the eighth day the child was well.

An infant a year old, at the breast, was severely affected for nearly two months, and when called to see the child it was in convulsions from the violence of the paroxysms, and not from dentition. The acid was given to lessen the latter, which it did most effectually, with a recurrence once only of a second attack of the former. The cough and hoop entirely disappeared by the ninth day.

A child aged three years, who had been ill upwards of three months in the winter season, and who was extremely emaciated, was put upon the acid, which improved the appetite and strength,

lessened the cough and hoop, and on the ninth day produced convalescence.

Of children between the second and fifth year, the cure was most generally effected between the fourth and fifteenth days. In infants the treatment was even more satisfactory, the duration of cure varying from the second and third to the tenth days. If the case became protracted, which it did in a few instances, it was entirely owing to the irregularity in the administration of the remedy.

My own experience accords with that of my friend in the fact, that the disease is found to be invariably more tractable in infants at the breast than in older children.

His method of prescribing the medicine for hoop-cough or asthma, will be found at page 311 of this work.

In his paper on the subject in the first volume of the *Canada Medical Journal*, he mentions that he has given as much as one drachm and a half of the acid during the day to a child two years of age.

The following is the manner in which I have employed this powerful remedy for a child under two years of age :*—

* The strength of the dilute acid of the London Pharmacopœia is one part of the acid to nine parts of water, the specific gravity being 1080. I prefer this form.

℞	Acid. Nitrici dil.	℥xij.	
	Tinct. Cardamomi Co.	℥ij.	
	Syrupi Simplicis.	℥ijss.	
	Aquæ	℥i.	M.

Vel,

℞	Acid. Nitrici dil.	℥xij.	
	Tinct. Gentianæ Comp.	℥iss.	
	Mellis optimi	℥ij.	
	Syrupi Simplicis	℥iss.	
	Aquæ	℥i.	M.

Fiat Mistura. Capiat cochleare medium quaque horâ, vel secunda quaque horâ.

For a very young infant, the dose may not exceed a teaspoonful every two hours.

For children from two to five years of age, the quantity of the dilute acid may be increased to fifteen drachms for an eight-ounce mixture, well sweetened with the honey or syrup, and given in the dose of from two to three drachms every hour, or every second hour, during the day time particularly.

℞	Acid. Nitrici dil.	℥xv.	
	Tinct. Cardamomi Comp.	℥v.	
	Syrupi Simplicis	℥ivss.	
	Aquæ	℥i.	M. Ft. Mist.

If the patient be an adult, or above ten years of age, half an ounce of this mixture may be taken every hour. The enlightened practitioner will use his own judgment as to the proper dose, according to age and circumstances.

To prevent injury to the teeth, a gargle composed of two drachms of the carbonate of soda to eight ounces of water, may be used *immediately* after taking the acid mixture.

When well sweetened and made very palatable, children get fond of this medicine, and eagerly look for its administration, when they find that it affords relief, by diminishing the frequency and severity of the paroxysms.

It must be remembered that the more frequent administration of the medicine produces a more rapid effect in cutting short the disease; and I have very seldom found it necessary to diminish the doses given, or even to caution the parents against its use. Nor have I seen any bad effects whatever from a persevering employment of it, in curing this disease. And its use has not been confined only to my friend Dr. Arnoldi and myself, but many others employ it with equally beneficial results, in a climate, too, which severely aggravates the malady, necessarily from the lowness of the temperature in the winter season, and the variable alternations in the spring and fall of the year.

As pertussis is not an inflammatory affection, no treatment of an antiphlogistic character is required, but if we see the disease in a plethoric child, with much congestion about the face and neck during the paroxysms, we may with propriety apply one or two leeches to the upper part of the back of

the neck, in the hollow which is so distinct in young children, and not trust to the acid alone.

In like manner, if congestion of the lungs is found, the acid may be stopped, and leeches applied to the chest, but this has never proved necessary in the course of my experience.

A troublesome symptom, which often causes anxiety, is the wheezing in the chest, from the mucous secretion in the lungs. It will be quite proper to give a mild emetic of ipecacuanha every evening, to unload the bronchial tubes, or as often as circumstances may render it necessary. This will prove very beneficial, and will add much to the comfort of the child.

Over-treatment in the simple form of this affection is particularly to be avoided.

When the disease has nearly disappeared, if the season of the year will permit, the commencement of the summer, for instance, we may then allow change of air, to renovate the health and restore the strength of the perhaps much weakened child. A change from the town to the country will be desirable, and such other strengthening treatment adopted as may be considered proper.

Hygienic measures are of great importance in hooping-cough, and assist most materially in warding off the complications, as well as expediting the cure.

The child should be kept in a well-regulated and

equable temperature of about sixty-four degrees, free from fluctuations of any kind, with an absence of both cold and moisture ; this is essential in the winter months especially, and in spring and autumn. A confinement to an airy nursery or bedroom, properly ventilated with pure air, with a careful avoidance of cold draughts, will be most proper ; or perhaps a large airy apartment to serve both as nursery and bedroom would be preferable, with attention to uniformity of temperature. Children should not be allowed to run about the house, upon the lobbies and staircases particularly, where draughts of air abound, and necessarily increase the severity and frequency of the cough, from the increased irritability of the bronchi. Attention to matters apparently so simple, proves oftentimes of great importance indeed.

The popular error of exposure to cold and open air is to be avoided by every rational practitioner. In the warm months of summer, if the patient is a healthy child, absolute confinement to the house may not be necessary.

The clothing should be warm and comfortable at all seasons, the winter especially, and flannel should be worn next the skin. The arms and chest of the child should be enveloped in a little flannel polka, or jacket, to prevent its becoming chilled during the daytime. And at night attention to the feet and general warmth must not be over-

looked, and the child's bed-clothes so arranged that they may not be pushed off during sleep.

Attention to the food and diet of the child is of some importance. It is a mistake committed by many, to starve the child by a lowering and spare diet. The food should be nourishing and light, and the child's appetite properly satisfied, but of course not carried to over-feeding, which is as injurious here as in any other disease, and especially brings on the paroxysms.

The usual farinaceous substances, with asses' or goats' milk, if either can be obtained, in place of that from the cow, will be most proper for a very young child, who may be weak and delicate.

If the child is older, and has been accustomed to it, animal food and beef-tea or chicken soup may be allowed. I cordially agree with Dr. Todd, that the general nutrition should be upheld in pertussis, and the real wants of the system supplied, and animal food, which is objected to by so many, should not be withheld.

If there be much fever present, it may be changed with advantage for a farinaceous and vegetable diet with milk, and a little chicken broth or soup. Cooling drinks may be allowed *ad libitum*.

Towards convalescence, in addition to the good diet, a little wine-and-water will prove serviceable.

A warm bath in the first stage is frequently

very useful at bedtime, and may be repeated every second or third day if requisite. Cold baths are inadmissible. But what will prove extremely beneficial, is sponging the back and front of the chest once or twice a day with cold water, to which has been added a little spirit, as recommended by Dr. Todd, taking the precaution to wipe the skin perfectly dry after it. This produces a bracing and tonic influence on the nerves, and in this manner acts very serviceably.

Another plan, equally good, likewise recommended by Dr. Todd, is the application of cold water, on the splashing plan, two or three times a day; doing it in a room with a warm temperature, and taking care to have the water thrown over the child rapidly, and not so as to wet the head. To let the back and chest receive the brunt of the splash.

Attention must also be paid to the child during and after the fits of coughing; the moment the cough has terminated in very young children, they must be raised if lying down, and placed in a sitting posture, because, if we allow them to remain upon their backs, we expose them to the danger of suffocation. The head of the child should be supported during the progress of the coughing with the hand, the face inclined downwards, so as to assist in the easy expectoration, and the occurrence of vomiting.

When the thick phlegm accumulates in any quantity in the mouth and throat, it must be removed by the finger, if we observe that the child is unable to reject it. Sometimes a mouthful or two of water, if the child can succeed in swallowing during the paroxysms, will diminish their duration and severity.

I cannot conclude this chapter without allusion to the use of chloroform, recommended by Dr. Churchill and Dr. Todd.

When it is important to produce a very decided immediate influence in checking the violence of the paroxysms, chloroform must prove invaluable; but it cannot, as Dr. Churchill shows, be used with advantage in very young children, for the two reasons which he mentions,—one, their inability to give notice of the approach of the cough, so that the chloroform may be in readiness before the paroxysm begins, and when it has begun, as it consists of eight or ten expirations to one inspiration, it will have evaporated before it has been fairly inhaled: the other, the horror manifested by young children at the presence of anything near their mouths during the cough, as shown by their resistance to inhalation, until they themselves have felt its power in relieving the cough.

In young persons of twelve years of age and upwards, these obstacles are removed, and the

treatment satisfactory, as shown by Dr. Churchill's four cases given at page 305.*

The three cases referred to in the note at the end of Dr. Todd's lecture, were in an advanced stage of the disease, and in a very much depressed state, with the lungs much congested, and a copious bronchial secretion, when admitted into King's College Hospital. In one case the chloroform diminished the number and violence of the paroxysms; in the second it seemed to depress; and in the third it produced no marked effect, beyond that of tranquillizing the child for a short time.

I am disposed to advise a continuation of the nitric acid treatment, according to my own formulæ, with moderate inhalations of chloroform; thus obtaining the direct influence of the peculiar properties of the acid upon the blood, as well as the good effects of the chloroform in lessening the severity of the paroxysm and obviating the rapidity of breathing which follows, essentially one of the dangerous elements of the disease.

If, therefore, while the use of the acid is continued, the inhalations of the chloroform are practised with the proper precautions, we may confi-

* Also Edin. Month. Jour., Aug. 1853, and vol. xviii. Ranking's Abstract.

dently look for more satisfactory results than have occurred from either remedy singly.

For young children, small doses of ten or fifteen minims, dropped upon a linen handkerchief, and held a short distance from the child's mouth, so that the air may be admitted along with the vapour of the chloroform, will prove the most convenient plan of administering it. This may be repeated at intervals according to the severity of the paroxysms, and as no warning can be given of their approach, it will be advisable not to wait for their invasion, as the chloroform will, I feel satisfied, ward them off as effectually as if used during their presence.

If there should be exhaustion or depression, the chloroform must be either omitted altogether, or used only in the smallest quantities.

Prophylaxis.—If the child has not had the disease, it should be removed from places where it reigns as an epidemic, and communication should be avoided with those who may be affected. The healthy child must be prevented from all intercourse, or indirect communication with the affected.

Children, again, who are suffering from the affection, ought not to be permitted to go to school, to church, or to associate with other children, until they are perfectly cured. Even persons who may bestow their attention and caresses upon an affected

child, must be considered as liable to transmit the disease to other children. Rosen is said to have transported the disease from one house to another ; and although these instances may be rare, nevertheless it is wise to guard against them, if the raging epidemic prove unusually fatal.

CHAPTER XIX.

TREATMENT OF THE COMPLICATIONS OF PERTUSSIS.

WE have something more to deal with when these present themselves, than in the simple form of the affection, and our treatment, which has hitherto proved so successful in it, requires now to be changed and applied in a different form, to arrest what often prove very grave and serious maladies.

These shall be briefly considered *seriatim*, but there is one thing never to be forgotten in the new and different phases assumed by pertussis,—that the diseases arising in its progress must not be treated upon any fixed rule, but upon general principles, as laid down by the most distinguished writers. Many of these will be brought under notice in the following pages.

Bronchitis.—If this affection is clearly established by careful auscultation, unassociated with pneumonia; in the treatment, we must remember the “peculiar impress” stamped upon it by the pertussal affection. Our efforts must therefore be prompt and energetic.

Leeches must be applied to the surface of the chest, and if the age and strength of the child will

permit, even bleeding from the arm may be practised; but in using the latter the utmost caution is to be observed, and it is not recommended unless the case will warrant it, at the very commencement of its invasion. The bleeding must be carefully arrested when the leeches have fallen off, and the child watched in the event of a recurrence, which sometimes will happen and cause irreparable mischief.

We must not be deterred from bleeding by the supposition of the disease being principally a nervous or spasmodic affection; and the quantity taken, if from the arm, will be regulated according to the age and strength of the child, which will be the more necessary if there is much oppression of breathing and dyspnœa.

When the bleeding has been stopped, a warm bath will prove of the greatest service, and immediately after, the child should be placed in a warm bed.

When the fever has somewhat subsided, a succession of small blisters may be applied to the chest, as recommended by Dr. Churchill, caution being observed not to leave them on too long, especially with infants, as the surface is apt to ulcerate when much inflamed. He says,—“Two or three hours are sufficient for children up to five or six years of age; and although there may be no vesication when we remove it, it will take place afterwards. Let me add, that it is better not to cut the blister

unless its prominence makes the child uncomfortable, and that the best dressing, if the surface be not broken, is French wadding or cotton wool."

Internally the employment of ipecacuanha wine is essential, combined with a little nitrate of potass, and this may be given in the dose of a few drops to infants every hour, and in larger doses proportionate to the age of the child.

It may be proper to substitute the antimonial wine, or the simple sweetened solution of antimony, for children above three years of age.

If preferred, powdered ipecacuanha may be given in grain doses, combined with nitre, and James's powder in equally small doses, to infants under two years of age. But of the two preparations the wine of ipecacuanha is more to be depended upon, as has been shown by the labours of the Analytical Sanitary Commission, published in the *Lancet*,* a matter of some importance in the treatment of this affection.

The use of these medicines will be continued until the child breathes freely, and the pulse remains slow and soft, but they must not be carried to absolute depression.

Very often when the bronchial tubes are clogged with mucus, an emetic of the wine or powder of ipecacuanha will prove of great service, and a good

* Vol. ii., 1853, page 14, *et seq.*

time for its administration is night and morning, for very obvious reasons.

Should there be much debility, and the child cannot expectorate nor reject much phlegm by the cough and vomiting, the decoction of senega must be given, combined with ammonia and squills, as are recommended in chronic bronchitis.

Of this valuable remedy, too much cannot be said in its praise as to its efficacy in numerous chest affections, and particularly in pertussal bronchitis and pneumonia; in my hands it has long been a remedy upon which I could place a good deal of reliance.

The bowels must be attended to by small doses of hyd. c. cretâ, or even calomel, and rhubarb, with the addition of a little scammony; these may be employed every night or every second morning, carefully avoiding much action.

If there be diarrhœa, it must not be permitted to continue too long, but gradually stopped with hyd. c. cretâ, Dover's powder, and one or two grains of rhubarb.

It will be proper in the last stages of this united affection to administer tonic remedies. None seem to answer so well as minute doses of quinine, well sweetened with syrup. If much secretion is still poured out in the bronchial tubes, the addition of equally small doses of sulphate of zinc, combined

with expectorant remedies, will be found sufficient to accomplish the cure.

Should it be deemed necessary during the progress of the stages of this complaint, blisters may again be resorted to, or sinapisms to the chest, to arrest any increase of dyspnœa; and if the paroxysms of coughing are severe and distressing, a sedative most properly indicated is hydrocyanic acid in very small and divided doses, combined with other substances.

Pneumonia.—A sudden increase of fever, and the supervention of a state of permanent dyspnœa, announce this inflammation, which, however, are not sufficient, without its confirmation by careful auscultatory evidence. As soon, therefore, as the crepitating râles are heard, immediate bleeding from the arm should be resorted to, and as freely as the strength of the child will permit, taking from two to four ounces according to the age and effects produced, and again to be repeated once or twice, if necessary. For an infant, our dependence must be upon leeches to the chest.

It must be remembered that if too much blood be abstracted, the child will sink from exhaustion, and if a sufficient quantity be not taken he will die from suffocation, as remarked by Dr. Roe; therefore some amount of discrimination will be necessary, and the depletion should only be con-

tinued until the urgent symptoms are relieved. As a general rule with children, abstraction of blood should never be carried too far.

In the secondary form of this affection, or of bronchitis, or of the two combined, we cannot use depletion, but must depend upon dry cupping and counter-irritation combined with other remedial means.

If leeches have been used and the bleeding has stopped, a large, soft, warm poultice of bread and milk or linseed meal should be constantly applied to the part affected. This may be removed when counter-irritants are to be applied, and then replaced. Dr. Churchill highly praises this; "it soothes the sensations, relieves the aching pain, quickens the action of the counter-irritants, and promotes expectoration."

Tartar emetic in small doses must be given internally—one grain to two ounces of water for a child under two years, and two grains for a child of four or five, combined with about two drachms of the syrup of white poppy, to check any tendency to action on the bowels. A teaspoonful of the mixture may be taken every two, three, or four hours.

This may be continued, so as to keep up a slight nausea, unless the bowels become affected, when calomel must be substituted and given in doses varying from one-fourth or one-third of a grain to

a grain every three, four, or six hours, guarded by a little Dover's powder, or of the powder of chalk with opium.

I have occasionally combined the antimonial and mercurial treatment, at the commencement of severe cases, with much benefit; the action of the two will sometimes quickly reduce the inflammation.

If the pneumonia is secondary, the calomel will be found of great use, should there be no diarrhœa; or, if that should come on, the hyd. c. cretâ must be given in its place. When tenderness of the gums follows, the mercury must be stopped; every one, however, is aware that salivation is very rare in children under five years of age.

If the child be much weakened, ammonia may be added to any expectorant mixture; or if there is a good deal of bronchitis present, it may be combined with decoction of senega and squills. The following prescription of Dr. Churchill's will be found exceedingly useful in this case:—

℞	Decoct. Senegæ	ʒij.
	Carb. Ammon.	ʒj to ʒj.
	Vini Ipecac.	ʒss.
	Syr. Smilac. Asp.	ʒiv.
	Aquæ	ʒij. M.

A teaspoonful every three or four hours.

Counter-irritation in the form of blisters will be most serviceable in the latter stages of the disease,

applied in a similar manner to that described in the treatment of bronchitis ; or sometimes a moderate-sized blister applied for a few hours only over the seat of the disease, and then another near it after the former has healed, will afford much relief.

Stimulating embrocations will prove serviceable when the cure is going on favourably, or an occasional stupe of warm turpentine will be particularly beneficial.

Dr. Churchill has seen great benefit from spirits of turpentine given alternately with either ipecacuanha or tartar emetic internally in both of these complications.

A useful plan to remember in these lung complications, is to change the position in sleep of the children and infants thus affected, in order to prevent the gravitation of too much blood on the particular side lain upon. I have long adopted this system with children, imbibed from the excellent precepts of my former kind preceptor, Dr. Stokes, of Dublin, but Dr. Ogier Ward is the first who has called attention to it in complicated pertussis.

Notwithstanding all our care, if the hepatization is extensively disseminated and accompanied with much sanguineous infiltration, the hopes of a recovery will be rendered utterly futile. Treatment to prove successful must be commenced early and energetically, and if time has been lost, or the little patient not seen until the disease has made

considerable progress, our best efforts will be paralysed, and our treatment rendered nugatory.

Pleuritis.—As this affection is rarely, if ever, unassociated with pneumonia in pertussis, it will be unnecessary to consider its treatment, as what has been already said about pneumonia will safely apply to it.

Congestion of the Brain, Convulsions, or Hydrocephalus.—When we have strong evidence of actual *congestion of the brain*, in the existence of drowsiness, hurried breathing, a flushed face and becoming livid during the suppression of the previously distinct hoop, a few leeches must be promptly applied behind the ears, or to the occiput, which will not only greatly relieve these symptoms, but will also diminish the frequency and severity of the cough.

As the violence of the cough may be in a great measure the cause of the congestion, the moment the opportunity presents itself we must administer the nitric acid mixture as recommended for the simple affection, and cut short what is so evidently tending to keep up this congested state of the cerebral vessels.

If there is much fever and irritability accompanying the congestion, we may safely recommend a tepid bath, to soothe both with advantage.

The hoop will return when the head is relieved.

When *convulsions* are apprehended, the treat-

ment must be directed to the removal of the exciting causes, if they can be ascertained. If the child is teething, the gums if necessary must be freely scarified, the bowels must be properly regulated in their action, and cold must be applied to the head.

The occurrence of carpopedal contractions, such as clinching of the hands, the thumbs being turned into the palms, screaming during sleep, momentary strabismus, drowsiness, nervous dyspnœa, and unusual irritability of the stomach, require immediate and active exertions to ward off the threatened convulsions. The application of leeches to the temples or mastoid prominences are indicated with other energetic treatment.

When they do occur, however, our object must be to prevent their recurrence. Leeches will be re-applied to the spots just mentioned, cold lotions to the head, and, if required, a blister to the nape of the neck ; these, with a brisk purgative, should immediately follow an attack of convulsions.

If the attack has arisen from dentition, besides scarifying the gums down to the teeth, and beyond those which are pressing forward, we should put the child into a warm bath for a few minutes, and, after carefully wiping the skin dry, place it in a warm blanket.

Dashing cold water upon the face will often terminate the fit.

Should the convulsions frequently recur, but with their severity mitigated by treatment, it has been recommended to establish a permanent drain by a seton of two or three threads in the arm.

We must not overlook two plans strongly recommended by Dr. Johnson to arrest the tendency to their frequent recurrence. "One is a total alteration of the child's diet, and the other is change of air. When the child affected is at the breast, defectiveness in quantity or quality will usually be detected in the nurse's milk. Often it will be found that she has menstruated, or, as sometimes happens, without the discharge actually occurring, she has experienced sensations similar to those which attend the accession of the catamenia. In such cases the milk almost uniformly disagrees, and hence it is a good rule, whenever the convulsive attacks withstand ordinary treatment, to inquire into the state of the nurse, and, if there be any ground of suspicion, to have a young and healthy one procured. Change of air often in the most remarkable manner puts a stop to the recurrence of convulsions, and will be found particularly beneficial in those cases of spasm of the glottis to which we have alluded."

If a child has been in convulsions for hours together, and should lay stretched out and motionless, the limbs being stiff with permanent carpopedal flexures, as occurred in a case under Dr. Roe's care,

where recovery seemed utterly impossible, we may be justified under such circumstances in opening the temporal artery, and bleeding to the extent of an ounce or two, until the rigidity of the muscles becomes relaxed, and this may be crowned with success as in his case.

In the majority of cases, unless the violence and frequency of the cough is lessened, our treatment will be useless, as the repeated arrest of the circulation at the termination of the paroxysms will again shortly reproduce the convulsion.

Four methods present themselves in such cases for effecting this object. The administration of—
1. Nitric acid; 2. Chloroform inhalations; 3. The same with Ether; and 4. Hydrocyanic acid.

The first requires little comment. I have given it in a case complicated with convulsions, with the most perfect safety and the best results. It supplies nitrogen to the blood, and prevents the tendency to the formation of fibrine, with which that fluid is already supercharged. It is therefore preferable to the three following:—

The second and third are recommended by Dr. Churchill, and are not contra-indicated here; they act in a similar manner to the nitric acid in relieving the cough, and also possess the remarkable tendency to prevent the formation of fibrine. Their depressing influence, however, requires caution in their use.

The fourth, from its powerfully sedative action, will relieve the cough, but in the cases mentioned by Dr. Roe, it was of no avail for weeks, until the head was relieved.

With regard to *hydrocephalus*, we must remember, that in conjunction with pertussis, unfortunately, this affection is more than usually fatal, and requires all our attention. Our treatment must be more active, to prevent, if possible, the accession of such a formidable malady. The means must be regulated to the age and constitution of the child; and, in the event of possible recovery, a long and exhausting disorder has to be encountered.

The hoop and cough almost always cease here, and the child lies in a state of more or less unconsciousness.

If the attack is recent, leeching will be absolutely necessary, with cold applications to the head; blisters behind the neck or ears, or upon the head, or flying blisters upon the forehead and head; sinapisms to the legs; and purgative medicines.

Above all, we must give a fair trial to mercury in whatever manner it may be best borne by the child, combined with James's powder; and afterwards the iodide of potassium in small doses. Should we be successful in controlling the secondary affection, a more liberal use of tonics will be

required with a more generous diet, and change of air, at an earlier period than is usual in the idiopathic brain affection.

In the treatment of all cerebral complications in pertussis, we must remember how much more dangerous they are than those which occur primarily: our efforts must therefore be always early directed to the warding off such evils, rather than to wait until they have fairly shown themselves.

Sanguineous Apoplexy.—If the symptoms of cerebral congestion manifest themselves, and threaten apoplexy, the immediate abstraction of a sufficient quantity of blood will be necessary, its repetition to be guided by the effects on the system of the first bleeding.

Should the drowsiness and stupor diminish, and the child appear more conscious of what is passing, with a return of intelligence, the bleeding may either be repeated at an interval, or we must have recourse to counter-irritation by means of blisters, cold lotions to the head, and active purgatives.

On the other hand, if there is no return of sensibility, or diminution of the stupor or coma with stertorous breathing, the case is then one of apoplexy from effusion of blood or of serum—the former if the coma and stertor have been rapid—and any treatment employed will be in vain.

Active measures may be tried by blisters and sinapisms, with free depletion by blood-letting, and

the administration of calomel in small doses, with mercurial inunction. With all these, it is extremely improbable any benefit will arise from their use.

Infantile Remittent.—The cough becomes more distressing according to the increase of the fever, particularly if it follows upon a previously disordered condition of the bowels; the fever therefore is what calls for relief in the treatment. Attention to the state of the bowels also is absolutely necessary. The observations upon purgative medicines in the next section will be applicable here.

The torpor of the bowels is sometimes so great as to be unrelieved by ordinary medicines, until some of the local congestions have been removed by leeching to the epigastrium or temples. Calomel alone, or with rhubarb and jalap, given so as to produce three or four evacuations daily, will be proper.

If, on the contrary, they are purged, or in a very irritable state, we must quiet them with chalk mixture and a drop or two of laudanum, or a little hydrargyrum cum cretâ, rhubarb, and Dover's powder, given three times a day.

If it depend upon teething the gums must be lanced.

Warm baths are very beneficial and soothing; fomentations or poultices of linseed meal to the abdomen are of great use. If it is desired to

produce mild counter-irritation, a fourth part of mustard may be added to the poultice.

A saline mixture of nitre and mild antimonials assists very much in abating the fever, but it must be omitted if it acts too much on the bowels.

If no irritation is present, small doses of nitric acid combined with nitric ether, and cinnamon water, sweetened with syrup, will not only relieve the fever, but arrest the severity and frequency of the cough.

The following prescription will be found of great benefit:—

R	Acid. Nitrici dil.	. . . . .	ʒiiss.
	Ætheris nitrosi.	. . . . .	ʒiiss.
	Syr. Simp.	. . . . .	ʒj.
	Aquæ cinnam.	. . . . .	ʒivss. M.

A dessert-spoonful to be given every three hours, for a child of from three to four years old.

If the fever is intense, and the exacerbations very severe, leeches to the abdomen have been recommended. They will prove useful in combating the tendency to hydrocephalus in this affection.

If it should persist after the regulation of the stomach and bowels, minute doses of quinine may also be given, and the diet carefully regulated. This should be light, such as milk in any form, with arrowroot, sago, tapioca, Indian-corn starch, &c., with cooling drinks *ad libitum*.

As it is often necessary to support the strength from the debility which is present, a little wine and water, or wine and arrowroot, may be given with benefit; and a more liberal diet of beef tea, chicken soup, &c.

Careful attention will in many cases prevent the *diarrhoea and intestinal disorder*, which are so often concomitant in pertussis. Intestinal derangement should always excite our solicitude, and should be corrected by keeping up the regular action of the bowels. If they are constipated, we may give a brisk purgative of calomel, scammony and rhubarb, followed by an enema, if the medicine is ineffectual.

It is not unusual to observe obstinate constipation present when congestion of the brain or about the head is considerable, and this will not yield to medicine until after the head is relieved by bleeding, as already mentioned in the treatment of remittent fever.

If the discharges from the bowels are unhealthy in colour or smell, without constipation, which are not infrequent, mild laxatives only, such as small doses of calomel or hydrargyrum cum cretâ with rhubarb, will be found sufficient to excite a beneficial action upon the mucous membrane, and restore the natural secretions.

Purging must never be carried too far, as it may produce tenesmus, scanty mucous stools, and tender-

ness of the belly, which will greatly aggravate the cough, and may lead to incurable marasmus.

When diarrhœa is present, which is very often and very considerable, and induced sometimes by congestion of the brain or serious disease in the lungs, it is most important to stop it gradually; it masks the presence of these diseases. For this purpose some mild astringent medicine should be given, such as chalk mixture, compound powder of chalk, powder of chalk with opium, &c. I prefer equal parts of hydrargyrum cum cretâ and rhubarb, with small quantities of Dover's powder, repeated three or four times a day.

Dr. Churchill advises the following simple mixture for a child a year old :—

R	Mist. Cretæ	℥j.
	Confect. Aromat.	gr. v.
	Syr. Zingib.	℥ij.
	Tincturæ Opii	gutt. ij. M.
	Cap. coch. j. parv. ter quaterve in die.	

Increasing the quantity of laudanum if the child be older, and adding a little tincture of kino or catechu if the purging be obstinate.

Poppy or warm-water fomentations to the abdomen will allay irritation; or gentle frictions of compound camphor liniment and laudanum, or of very mild tobacco liniment, will prove useful.

When all other means fail, a small starch enema,

with a few drops of laudanum, will often arrest the diarrhoea.

If the diarrhoea is proving a salutary discharge, and not otherwise injurious, it may not be arrested unless it becomes violent.

The irritability of the stomach, with occasional vomiting, is often very distressing, and troublesome to arrest. The greatest care should be taken to feed the child in very small quantities at a time, and if it throw up its nurse's milk, to suspend it for a few hours, and give a teaspoonful of water two or three times within half an hour, and if retained, to follow it by a little isinglass in water in the same quantity, frequently repeated, as recommended by Dr. West.

It may be proper, if this irritability continues, to give very small doses of calomel upon the tongue, and to apply a mustard poultice to the epigastrium.

If the symptoms assume those of remittent fever, it is to them our attention must be directed, and the treatment adopted as described in the last section.

Softening of the Stomach.—There is no special treatment for this affection. Should we be enabled to diagnose the inflammation at the commencement, we might use the remedies for gastritis, and, if successful, prevent the stage of softening.

Rilliet and Barthez recommend chiefly the

gummy extract of opium, or, if this cannot be given internally, muriate of morphia is to be sprinkled over a small blistered surface at the epigastrium.

Dr. Lion, of Breslau, depends principally upon external means and a suitable diet, very small quantities of food at a time, a warm bath, mild enemata, exercise in the open air, an aromatic plaster to the stomach, and internally the decoction of acorns, carbonate of iron, or the tinctura ferri muriatis.*

General Dropsy.—Dropsies ordinarily disappear when the paroxysms have ceased, and the patients gain their strength; we may promote absorption by diuretics, diaphoretics, but above all by tonics, with good diet and regimen.

Should ascites prove troublesome and resist the ordinary treatment, diuretics may be tried externally, as recommended by Dr. Christison, of Edinburgh, and subsequently by my friend Dr. David, of Montreal.† A liniment composed of equal parts of tinctures of digitalis, squills, and soap, is to be rubbed into the abdomen three or four times a day. I can testify to the remarkable effects of this form of treatment, having used it

* Ranking's Abstract, vol. i., and Churchill on Diseases of Children.

† Canada Medical Journal, vol. i. p. 527.

successfully in a case of renal dropsy, which had resisted all other means of cure.

When the *Exanthemata* arise during pertussis, our aim must be to conduct them by proper management to the end of their course, without interruption; their sudden subsidence may produce extreme dyspnœa and a short harassing cough, with dangerous cerebral symptoms, and our efforts must be directed to prevent this.

The presence of any of these will sometimes produce a temporary abatement in the paroxysms of the cough, and the eruptive disease itself will progress favourably. When measles or scarlatina are present, we must always apprehend an attack of bronchitis or pneumonia, and therefore be prepared to meet it.

The treatment of *measles* will be very simple in mild cases,—confinement to a warm chamber, a spare diet, and gentle antiphlogistic remedies. Small doses of antimonial and ipecacuanha wine, with laudanum or the compound tincture of camphor, given every few hours, will relieve the cough. A blister the size of a shilling, applied to the trachea, at the point just above the sternum, for three or four hours, without vesication, and now and then repeated during the course of this affection, will prove useful.

Scarlatina requires little interference; all that is necessary being a cool, well-ventilated chamber,

a spare diet, mild antiphlogistic medicine during the progress of the fever, and occasionally sponging the surface with warm water to relieve the heat of skin.

When the disease is *small-pox* we must adopt a cooling regimen, a spare diet, and mild antiphlogistic medicines. The bowels are to be kept gently open, and fresh air admitted into the chamber. Should convulsions occur, or frequently recur, or end in coma, we must use depletion with an unsparing hand, as cerebral congestion, which attends the onset of the eruptive fevers, if not speedily relieved, may prove very quickly fatal.

Varicella requires no treatment beyond a mild antiphlogistic regimen.

Tuberculosis, in its origin, may be often attributed to an attack of measles, preceding the pertussis; it may succeed to the intercurrent bronchitis or pneumonia, or it may develop itself in consequence of the existence of a scrofulous diathesis, in the course of the affection. It may not be suspected for some time, until hæmoptysis or some other symptom will draw our attention to it.

When we have a strong suspicion that it may subsequently show itself, or are satisfied as to the truth of its presence, our treatment must be either preventive, curative,—when the disease is incipient or limited in extent,—or palliative.

In the child affected with pertussis, both the

preventive and curative treatment may be said to be the same, as what might be recommended for the former—such as change of climate, &c.—in a grown-up child or an adult cannot be adopted here. Cod-liver oil may be given with the most beneficial effects, and its influence on children will be often pretty certain and conspicuous. It will be of importance to arrest the violence of the cough, and the phthisical symptoms need not prevent our giving the nitric acid, which of itself has proved of much value in relieving the cough in phthisis, according to the experience of my friend, Dr. Arnoldi, of Montreal.

Such other remedies as are recommended in tubercular affections will be employed by the enlightened practitioner as they may suggest themselves, according to the indications present in the course of this complication.

When the *pregnant* female is attacked with hooping-cough, our efforts must be directed to supporting the strength and relieving the effects of the pertussal disease. What has been said in the treatment of the simple affection will be applicable here, only the nitric acid must be given in the proper doses for adults, and proper attention paid to the general comfort and convenience of the patient.

In *hysteria*, likewise, the same treatment must be adopted ; it was not used in the case described,

and therefore may prove successful in a similar one. The peculiarity of this complication is such, that it becomes a matter of no ordinary difficulty to pronounce what will be useful in the event of nitric acid, combined with other general and moral treatment, proving unavailing.

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ERRATA.

Page 1, line 12, *for immediate read intermediate.*
 „ 8, line 16, *for spinalis read oblongata.*
 „ 54, line 22, *for depends read depend.*
 „ 59, line 15, *for uninterrupted read interrupted.*
 „ 71, line 30 *should exchange places with line 29.*
 „ 78, line 21, *for on read or.*
 „ 99, line 21, *insert 7. before Pertussis.*
 „ 115, line 9, *for complicated read uncomplicated.*
 „ 138, line 22, *for lung read lobe.*
 „ 139, Note, *for 1835 read 1845.*
 „ 190, line 16, *for influences read inflames.*
 „ 256, line 12, *for difficult read difficulty.*
 „ 342, line 10 (in second prescription), *for 3j. read 3j.*

THE END.

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